

International Conference

on

Recent Advancement and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025)

February, 07-08, 2025

INSIGHTS

Book of Abstracts

Organized by

Department of CSIT

Acropolis Institute of Technology and Research, Indore, MP, India



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Preface

It is our privilege to present the Book of Abstracts, “INSIGHTS” for the International Conference on Recent Advancement and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025). We hope this collection serves as a valuable, inspiring, and insightful resource for all participants.

This compilation features abstracts of papers accepted and registered for presentation at RAMSITA-2025, hosted by the Department of CSIT at Acropolis Institute of Technology and Research, Indore, Madhya Pradesh, India, on February, 07–08, 2025. The conference aims to provide a dynamic platform to explore advancements, challenges, and applications in sustainable intelligence. Through a wide range of sessions, RAMSITA-2025 highlights real-world case studies, technologies, and cutting-edge research in domains such as Artificial Intelligence (AI), the Internet of Things (IoT), data science, blockchain, smart computing, VLSI, and 5G etc. By addressing contemporary issues, the conference fosters global collaboration among students, researchers, academicians, and industry professionals.

All accepted and presented papers of RAMSITA-2025 are part of proceedings published by ATLANTIS PRESS (part of Springer Nature Group) – Advances in Intelligent Systems Research, an open access series. All articles published in proceedings in this series are indexed in CNKI, Dimensions, EBSCO Discovery Service, INSPEC, Google Scholar, Naver, OCLC WorldCat Discovery Service, ProQuest-ExLibris Primo, ProQuest-ExLibris Summon, TD Net Discovery Service, Wanfang Data. Also, selected titles will be submitted for evaluation in CPCI (part of Clarivate’s Web of Science), and where applicable, they are also submitted to Ei Compendex and Scopus (Subject to acceptance).

It is our hope that this Book of Abstracts inspires meaningful discussions, fosters collaboration, and drives innovative solutions in the field of sustainable intelligence. We look forward to your active participation and to witnessing the profound impact this conference will have on the global research community.

Acknowledgment

We would like to express our heartfelt gratitude to everyone who contributed to the successful publication of the Book of Abstracts, “INSIGHTS” for the International Conference on Recent Advancement and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025) organized by the Department of CSIT at Acropolis Institute of Technology and Research, Indore, Madhya Pradesh, India, on February 7–8, 2025.

First and foremost, we are immensely grateful to the authors for their valuable contributions. Their research forms the cornerstone of this publication and enlightens wisdom in sustainable intelligent technologies.

Our sincere thanks go to the Reviewers for their diligent and constructive feedback, which ensured the quality and rigor of the work presented in this INSIGHTS.

We appreciate the support extended by the Sponsors: Asmakam University, Indore, QuickCopy, Asia University (Taiwan), Mathworks, IEEE Student Branch, TCS, Springer Nature, Niti Industries and Cyber Secured India (CSI) for their unconditional support in event.

We extend our sincere gratitude to the members of the Steering Committee, Technical Committee for their expertise and thorough evaluations, as well as to the National and International Advisory Committee for their invaluable guidance and support in shaping the conference and its outputs.

This conference would not have been possible without the unwavering support and guidance of our esteemed Patrons and Director, AITR. We extend our heartfelt gratitude to them for their motivation, trust, and belief in the committee of RAMSITA-2025.

Compiling and arranging all the abstracts into a cohesive book required tireless efforts and meticulous proofreading, which would not have been possible without the dedication of an Expert Team. We appreciate efforts of the CSIT Team for their invaluable contributions during designing and proofreading process.

Finally, we extend our heartfelt gratitude to everyone who contributed, directly or indirectly, to the creation of this Book of Abstracts. It is through the collective efforts of all stakeholders that RAMSITA-2025 has successfully achieved its objectives, providing a platform for innovation, knowledge exchange, and collaboration.

Thank you all for your invaluable contributions and support.

RAMSITA-2025 Team

Messages

Chairman BOG

It is with immense pride and honor that Acropolis Institute of Technology and Research (AITR) is set to host the prestigious International Conference on Recent Advancements and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025). This remarkable event aims to foster collaboration among academicians, researchers and industry professionals, addressing critical issues and presenting innovative, sustainable solutions within the dynamic field of computing.



Er. Ashok Sojatia

In today's rapidly evolving technological landscape, sustainability is essential. RAMSITA-2025 places a strong emphasis on integrating sustainable practices into intelligent technologies, encouraging participants to explore solutions that not only advance innovation but also address global environmental and social challenges. The conference serves as a platform to bridge the gap between academia and industry, exposing researchers to cutting-edge advancements while fostering a research environment grounded in responsibility and sustainability.

I am grateful to all invited speakers, authors, scholars, and participants for their contribution. I am confident that this conference will serve as an inspiring platform for exchanging knowledge and fostering meaningful interactions, while driving forward sustainable innovation. It is sure to be a rewarding and unforgettable experience for everyone involved.

I wish the conference every success.

Group Chairman



Er. Ashish Sojatia

Acropolis Institute of Technology and Research, Indore is honored to host the International Conference on Recent Advancement and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025). This event provides a platform for academics, researchers, and industry professionals to collaborate on emerging challenges and sustainable solutions in computing and intelligent technologies. In the face of globalization and rapid technological changes, it is vital to equip engineering students with cutting-edge knowledge and foster research activities that bridge the gap between academia and industry.

RAMSITA-2025 emphasizes sustainability, encouraging innovative approaches to address global challenges while advancing technology responsibly. We believe that the esteemed speakers, authors, scholars, and delegates will engage in insightful discussions, exchange ideas, and gain valuable knowledge from the sessions. We hope the conference inspires collaboration, fosters sustainability-driven innovation, and provides an enriching experience for all participants.

Best wishes for a successful conference!

Chairman

In a society driven by information, educational institutions are instrumental in shaping the next generation. Their role extends beyond the simple delivery of facts; it is about nurturing critical thinking, developing problem-solving skills, and fostering a lifelong love of learning. With the growth of Artificial Intelligence (AI) applications, it is the primary responsibility of humans to develop sustainable applications.



Er. Gaurav Sojatia

The inaugural International Conference on Recent Advancements and Modernization in Sustainable Intelligent Technologies Applications (RAMSITA-2025), organized by the CSIT department, focuses on integrating sustainability into modern technologies. With proceedings published by Springer Nature, the event aims to equip scholars with essential skills for a greener digital future.

Acropolis Institute of Technology and Research has always strived for excellence, and this conference marks another significant milestone in our continuous journey. I encourage all participants to engage actively, share their perspectives, and contribute to the exchange of ideas that foster innovation in alignment with environmental responsibility.

I offer my best wishes for a successful, impactful, and a sustainability-oriented conference.

Secretary



Shri Anand Sojatia

It is a matter of immense pleasure that the Acropolis Institute of Technology and Research is organizing the Springer Nature International Conference on Recent Advancements and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025). This conference serves as a platform to explore cutting-edge research and sustainable advancements in computing.

The rapid advancements in the computing field are creating a ripple effect across social, political, economic, and management systems globally, contributing to the formation of a more interconnected and unified world. The conference will provide students and faculty with a platform to explore the latest in sustainable technologies and address current technical challenges and future trends.

I send my heartfelt wishes and sincere congratulations to all those who have contributed their utmost efforts to ensure the success of this conference.

Vice Chairman

I am honored to introduce the Springer Nature International Conference on Recent Advancements and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025) organized by the CSIT department at Acropolis Institute of Technology and Research. This conference serves as a platform to explore cutting-edge research and sustainable advancements in computing. It brings together a diverse group of researchers, academicians, and industry professionals to share insights and innovations.



Prof. M. K. Dube

RAMSITA-2025 emphasizes the integration of sustainability into modern technologies, addressing global challenges, and fostering innovative, eco-conscious solutions. Through presentations, interactive sessions, and discussions, participants will exchange ideas, forge collaborations, and gain valuable insights into sustainable computing practices.

The conference reflects our commitment to research excellence and environmental responsibility. We sincerely thank the authors, speakers and participants for their invaluable contributions.

Wishing all attendees a successful event that inspires innovation, collaboration, and progress toward a sustainable future.

Director

It is with great pleasure that I present the Book of Abstracts, “INSIGHTS”, for the International Conference on Recent Advancements and Modernization in Sustainable Intelligence Technologies & Applications (RAMSITA-2025). This compilation showcases cutting-edge research and innovative ideas at the intersection of sustainable intelligence and modern technology, offering insights into emerging trends, methodologies, and practical applications.



Prof. (Dr.) Shashi Chandra Sharma

The conference serves as a global platform for knowledge exchange and collaboration, addressing interdisciplinary challenges in integrating sustainability with intelligent technologies. These abstracts reflect the dedication of contributors and highlight advancements that are critical to the fields of sustainability and technology.

I extend my sincere gratitude to the authors, reviewers, and organizing committee for their invaluable efforts, as well as our esteemed technical sponsors— Asia University, Taiwan, IEEE Student Branch, TCS, Asmakam University, MathWorks, AND Niti Industries for their generous support.

I hope the insights gained from this conference inspire further research and innovation, driving us toward a more sustainable and technologically advanced future.

Conference Chair

Welcome to the Book of Abstracts INSIGHTS for the International Conference on Recent Advancements and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-2025).

As the world faces pressing challenges such as climate change, resource scarcity, and environmental degradation, the need for sustainable solutions has never been more critical. Sustainable intelligence, an interdisciplinary field, seeks to address these challenges by leveraging advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), blockchain, data science, 5G etc.



Prof. (Dr.) Shilpa Bhalerao

These technologies not only optimize resource utilization but also contribute to building systems and applications that are both efficient and environmentally conscious.

RAMSITA-2025 provides a platform for researchers, academicians, and industry professionals to converge and discuss the transformative potential of sustainable intelligence. The abstracts in this collection show the depth and diversity of ongoing research, covering real-world applications, theoretical advancements, and case studies that showcase the integration of technology with sustainability.

Through this conference and its proceedings, we aim to foster global collaboration and inspire actionable insights that contribute to a more sustainable future. The INSIGHTS is a testament to the collective efforts of the authors, reviewers, and organizers, all of whom share a vision of a technologically advanced yet environmentally responsible world.

INSIGHTS features around hundred abstracts selected from over 450 papers submitted from around the world, following a rigorous review process. We have received papers from USA, Indonesia, Oman, Fiji, Australia etc. During the conference, 10 distinguished speakers from the India, USA, Taiwan, and Oman shared their knowledge on sustainable intelligence, discussing the development, scope, and significance of research in sustainability.

We sincerely hope that this compilation serves as a valuable source of knowledge and inspiration for readers and contributes meaningfully to the growing discourse on sustainable intelligence.

Conference Co-Chair



Prof. (Dr.) Praveen Gupta

We're excited to share the Book of Abstracts INSIGHTS for the International Conference on Recent Advancement and Modernization in Sustainable Intelligent Technologies & Applications (RAMSITA-25).

This book serves as a platform where students, researchers, academics, and professionals from around the world come together to share and discuss their work on cutting-edge topics like Machine Learning, Intelligent Systems, Robotics, Deep Learning, IoT, 5G, Cybersecurity, AR/VR, and many more.

As Co-Chairs, it has been a privilege to be part of this journey. The incredible research and innovative ideas showcased in this collection are truly inspiring. Each abstract reflects not just the hard work and dedication of its authors but also their passion for advancing knowledge and addressing real-world challenges.

We hope these contributions spark new conversations, foster collaborations, and lead to future breakthroughs. This isn't just a Book of Abstracts—it's a snapshot of the creativity, innovation, and determination driving our community forward.

To all the contributors who made this conference possible, thank you! Your efforts have made RAMSITA-25 a resounding success, and we're confident that the exchange of ideas here will inspire progress long after the conference wraps up.

We hope you enjoy exploring this INSIGHTS and find it as exciting and insightful as we do. Let's keep pushing boundaries and shaping the future together.

We wish Conference all the very best.



Prof. (Dr.) Vandana Kate

Speakers

Emerging Trends and Key Challenges in Cybersecurity: Exploring New Opportunities and Future Perspectives

Professor Brij Bhooshan Gupta is a distinguished professor at Asia University, Taiwan, specializing in various domains of information security. With a Ph.D. in Computer Science from the Indian Institute of Technology (IIT) Roorkee, India, Professor Gupta has expertise in fields of cyber security, cloud security, mobile and web security, artificial intelligence, and Internet of Things (IoTs).

His research interests also include intrusion detection and network performance evaluation, areas where he has contributed significantly to both academia and industry.

In addition to his research, Professor Gupta is known for his dedication to teaching and mentoring the next generation of experts in the field of information security. He is actively involved in several academic and professional initiatives and continues to contribute to the advancement of knowledge in his areas of expertise.



Dr. Brij B. Gupta
Professor
Asia University, Taiwan

Abstract

Today, computers are increasingly being used for storing and retrieving information. Some of this information is of a sensitive nature requiring adequate security measures to safeguard the sensitive information. It has also brought unparalleled and potential challenges with them. Moreover, attackers keep changing their attack strategies rapidly to hide their actual identity. In addition, cyber space is considered as fifth battle-field after land, air, water and space. Therefore, strengthening the security has become a vital homeland security mission and critical information infrastructure protection. Security Challenges is the protection of information systems, hardware, software, and information as well from theft, damages, interruption or misdirection to any of these resources and critical information infrastructures. Therefore, to protect against various attacks, security specialists need to keep concocting new schemes to control any new attacks. While protecting against naïve attacks, some type of advanced techniques should be included in the lineup of security tools or software. Hence, in this talk, I will discuss about recent research trends and challenges in Cybersecurity and will also highlight various opportunities and future Perspectives to contribute to enhance overall security of a system.



Mr. Kamalesh (Kumar) Sai
IT Manager
Highmark Inc, USA

Kamalesh Kumar Sai is a seasoned IT Manager with over 20 years of experience driving digital transformation and aligning technology with business goals at Highmark Inc., based in Mechanicsburg, Pennsylvania. Certified in Google Cloud and IBM solutions, Kamalesh excels in cloud architecture, IT strategy, and data governance. He leads a team of 45+ professionals, fostering collaboration and innovation while optimizing operations to save \$4-5M annually.

Kamalesh has implemented big data platforms, saving \$10M and enhancing client services. With strong expertise in IT operations, healthcare standards, and data security, he has mentored over 45 team members to build a high-performing workforce. Holding a master's degree from Maulana Azad National Institute of Technology, he is passionate about leveraging technology for impactful results.



Ms. Vimla Sai
IT Professional
Mechanicsburg,
Pennsylvania, USA

Vimla Sai is a dynamic and visionary leader with over 17 years of experience in technology solutions, project management, and strategic leadership. Currently serving as Manager, Product & Technology Solutions at enGen, with expertise in driving enterprise-wide success through innovative change management and mentoring teams. Founder and President of SaiGill LLC, delivering bespoke technology solutions for over 13 years.

Known for creating unique applications like ETIS and SCPM, excelling in budgetary oversight, and fostering professional growth. Proficient in building high-performing teams and revitalizing underperforming areas. Holds a Master's degree in Computer Applications from Banasthali Vidyapith.

Abstract

Generative AI is rapidly transforming the landscape of software development, offering a powerful helping hand to developers across various tasks. By leveraging deep learning models trained on vast code repositories, generative AI tools can automate repetitive coding tasks, suggest code completions and improvements, and even generate entire software applications from natural language specifications or high-level designs. This technology promises to significantly accelerate the software development lifecycle, reduce errors, and empower developers to focus on higher-level creative problem-solving and innovation. This abstract explores the diverse applications of generative AI in software development, including code generation, bug detection, testing, and documentation. Furthermore, it discusses the potential benefits, challenges, and ethical considerations associated with this emerging paradigm shift in software engineering, emphasizing the importance of responsible development and deployment of generative AI tools to augment human capabilities and shape the future of software creation.

Overview on Corporate Environmental Sustainability: Certainty for a Better Planet for the Future

Ashish Jogey is an experienced Consultant in Environmental Sustainability and Health & Safety, currently working at Tata Consultancy Services (TCS) in Indore. With a strong background in ESG, he has contributed significantly to environmental management and safety protocols across multiple industries.

Before TCS, Ashish held leadership roles, including Assistant Manager of EHS at JLL India and Senior Executive at Bureau Veritas, where he focused on implementing safety and environmental strategies. He began his career as an HSE Engineer at Mahanagar Gas Limited in Mumbai.

Ashish is dedicated to promoting sustainability through innovative solutions. He holds a postgraduate diploma in environmental management, with specializing in Environmental Sustainability and ESG. He also has an advanced diploma in industrial safety. Fluent in Hindi, English, and Marathi, Ashish is committed to creating safer and more sustainable environments.



Mr. Ashish Jogey
Consultant
Environment Sustainability
Health and Safety
TCS, ESG
Indore, MP, India

Abstract

In the modern era, environmental sustainability has become a pressing issue due to human activities' significant impacts on planetary health and future generations' well-being. Despite historical resource exploitation and industrial pollution, movements and laws aim to tackle these challenges. Corporate sustainability is a holistic approach to conducting the business while achieving long-term environmental, social, and economic sustainability.

The integration of sustainability into strategic planning is not just a trend but a fundamental shift in how businesses operate to survive. This shift is driven by a confluence of factors, each pushing companies to reconsider their role in society and the environment.

This talk explores various aspects of environmental sustainability, from conservation to promoting: Renewable energy, water conservation & reuses, natural resource, resilient infrastructure, urban biodiversity enhancement, circular economy, waste management, Health & Wellbeing, life cycle perspective & so on.



Dr. C. Jayakumari
Associate Professor
Middle East College, Oman

Dr. C. Jayakumari has been serving as an Associate Professor in the Department of Computing and Electronic Engineering since 2016. She earned her Ph.D. in Computer Science from Mother Teresa University in 2009 and holds a Post Graduate Certification in International Higher Education Practices from Coventry University, UK

Additionally, she has completed certification courses in Artificial Intelligence and Blockchain Technologies. Her research expertise lies in Image Processing, Big Data, Artificial Intelligence, and the Internet of Things (IoT). She has successfully led two funded projects sanctioned by The Research Council of Oman and is currently overseeing an ongoing project. She has also guided student-led funded undergraduate research initiative As a dedicated research supervisor, she has guided five scholars to complete their PhD programs and has produced around 17 M. Phil graduates from various universities.

She plays a significant role in academic governance, having served as an external panel member, and as a member of the syllabus review and doctoral committees for PhD programs across multiple institutions. Her scholarly contributions include numerous publications in indexed journals, international conferences and co-authoring two book chapters with reputed publishers. She has also chaired several conferences and serves as a member of the review and editorial boards for various journals.

Abstract

As we stand at the threshold of a technological revolution, quantum computing emerges as a transformative force poised to redefine the landscape of computation. This talk, "Exploring the Quantum Frontier: A New Era in Computing," will delve into the fundamental principles of quantum computing cutting-edge field, such as qubits, superposition and entanglement. Additionally, we will discuss the practical implications of quantum computing across various sectors, including cryptography, materials science, and drug discovery. By addressing both the opportunities and challenges that lie ahead.

How to Lead in The Age of AI

Siddhanta De is an accomplished business leader with over 15 years of expertise in digital transformation and technology enablement. He is currently a Partner at BCG Singapore, focusing on strategy, business launches, tech modernization, and digital enablement.

Previously, he held leadership roles at IBM, specializing in Hyperautomation and Blockchain, and at Virtusa, delivering client solutions and developing practices. An alumnus of IIM Lucknow (PGDM in Finance & Systems) and IIT ISM Dhanbad (B. Tech in Electronics), Siddhanta blends technical expertise with strategic insights.

His core skills include business strategy, transformation, and financial services. Siddhanta is also a thought leader, having contributed to publications like "Auto Claims Servicing Solution for the Millennial Customer."



Mr. Siddhanta De
Partner, BCG, Singapore

Abstract

Leading in the age of AI Artificial Intelligence (AI) is a transformative technological paradigm, revolutionizing industries and daily life through advanced automation. Its being hailed as Fourth Industrial Revolution by business & tech leaders globally. However, it poses multiple disruptive risks such as job displacement, economic disruption, loss of privacy, misinformation & negative climate impact. Addressing these risks demands a collective effort from society across topics - ethical governance, equitable AI deployment, workforce upskilling, misinformation detection, and energy-efficient AI. Requires strong public private partnership to be successful. As individuals and leaders, we have an important role to ensure AI serves as a force for good. By fostering transparency, accountability, and inclusivity, we can ensure AI can help solve pressing global challenges and enhance human progress.



Dr. (Mrs.) Maya Ingle
Senior Faculty, SCSIT,
DAVV, Indore

Dr. (Mrs.) Maya Ingle is a distinguished academician and researcher with a Ph.D. in Computer Science, M. Tech. from IIT Kharagpur, and a rich academic background including postgraduate qualifications in Statistics and Music. With 38 years of technical and administrative experience, she has served as a Senior Faculty at SCSIT, DAVV, Indore, and held key roles such as Director, DDU-Kaushal Kendra, and Dean of Student Welfare at DAVV. Dr. Ingle has guided 21 Ph.D. scholars and has extensive publications in reputed journals. Her research interests include Usability Engineering, Agile Computing, and Statistical NLP.

She an assessor for accreditation bodies like NAAC and NBA. Dr. Ingle has received numerous accolades, including the Lifelong Scientific Achievement Award (2022) and Pratibha Samman (2024). Passionate about community service, she supports initiatives for visually challenged students and education for underprivileged children. A recognized expert in her field, she frequently serves as a keynote speaker, reviewer, and evaluator at national and international levels.



Abstract

Generative AI has grappled its importance due to advancements in AI; namely Deep learning, Big Data and availability of High Computing facilities. Initially, the focus of AI was on rule-based systems and pattern recognition. Gradually, the statistical models, such as Hidden Markov Models and early neural networks, laid the groundwork for generative approaches. The models generate realistic text, images and audio laying the foundation for today's generative AI capabilities. Today, generative AI is widely integrated into many industries and applications. Advanced models like OpenAI GPT (for text generation with Language Modelling) has demonstrated the potential of AI to create realistic, creative, and high-quality outputs. Also, Generative AI is getting extensively used in content creation, marketing, gaming, virtual reality, drug discovery etc. This AI can generate human-like text, art, and even realistic deepfake videos and audios. The future of generative AI promises extensive advancements, including more refined and personalized outputs. With continuous improvements in model architecture, training data, and computational power, AI is expected to become capable of creating entirely new forms of media, generating complex scientific models, or simulating realistic virtual environments indistinguishable from the real world. Ethical challenges will also evolve, with increasing concerns about misinformation, deepfakes, copyright issues, and the regulation of AI-generated content. AI systems will be capable of autonomous decision-making and innovation, raising new societal and philosophical questions. Generative AI's trajectory suggests that it will continue to disrupt industries, but it will require careful management to balance innovation with ethical regulations.

Eminent Speakers

Dr. Sudarshan Iyengar is a renowned academician with nearly 20 years of experience in teaching, research, and educational innovation. He is the Head of the Department of Computer Science and Engineering at IIT Ropar and leads the institute's Minor in AI Program, initiated in August 2024.

An alumnus of IISc with a Ph.D. in Computer Science, his expertise includes artificial intelligence, data science, and EdTech. Dr. Iyengar advocates for modern teaching methodologies and mentors educators nationwide to enhance learning outcomes.

12 years at IIT Ropar, he has aligned academics with evolving industry needs, integrating cutting-edge technologies and research-driven learning. His work emphasizes innovative pedagogy and impactful education, inspiring future technology professionals and educators.



Dr. Sudarshan Iyengar
Associate Professor
IIT Ropar, India



With over 13 years of experience in high-value payment ecosystems, Gaurav Joshi is an expert in end-to-end payments, specializing in cross-border payment processing and the intersection of transaction management and financial technology. Having worked with industry leaders such as TCS, Capita, Capgemini and Commonwealth Bank of Australia, Gaurav currently leads transformative initiatives as a Senior Manager at KPMG India. His focus lies in revamping global banking infrastructures by implementing decentralized systems in line with global SWIFT standards and integrating cutting-edge technologies such as Cloud, Kafka, and APIs to ensure seamless payment processing.

As an alumnus of DAVV (IIPS) with an MTech in IT and GIM Goa with a PGDM in Finance, Gaurav is passionate about turning challenges into opportunities within the ever-evolving payments landscape. He is committed to empowering organizations to thrive in a digital-first world, bringing innovation and excellence to financial operations and ensuring robust, future-ready payment solutions.



Mr. Gaurav Joshi
Manager
Financial Services and Security
KPMG, Bangalore, India

Panel Discussion

Sustainability and Consciousness

Manish Gehlot is an alumnus of IIT Bombay and an MBA graduate from the University of St. Thomas, Minnesota, Manish Gehlot currently serves as the Chief Strategist for Medius Earth, a socio-climate mass-forestation startup. In addition, he heads Oracle Supply Chain Management Consulting for Infosys Consulting North America. His extensive professional journey includes leadership roles at Oracle USA, IBM, Accenture, and CP Wholesales.



Mr. Manish Gehlot
Oracle CRL Practice Lead
Infosys Consulting,
North America

For the past 14 years, Manish has been deeply committed to water conservation, including rainwater harvesting and storage initiatives. His passion lies in empowering youth across the globe, inspiring them to unlock their inner potential.

Manish also actively supports two family-led social impact startups. Asmakam Life University, where he contributes to the life skills vertical, focuses on sustainability, wellness, and community-driven learning. Meanwhile, Cotfoo emphasizes connecting people through food by linking families directly with natural farmers, promoting healthy and sustainable lifestyles.



Archana Parsai Gehlot is an alumna of IIT Bombay and a former Product Strategy Director at Oracle USA, Archana Parsai Gehlot is a U.S. citizen with over 20 years of executive experience in leading IT companies. After a remarkable corporate career, she embraced a creative and sustainable lifestyle that has reshaped her approach to health, education, and food. For the past decade, she has been dedicated to a philosophy of zero outsourcing in these domains.



Ms. Archana Parsai Gehlot
Ex Product Strategy Director
Oracle USA
Founder of Asmakam Life
University

Her journey has given rise to two impactful social initiatives. Asmakam Life University is focused on sustainability, wellness, and life skills, fostering a community driven by conscious living. Cotfoo promotes food as medicine and connects natural farmers directly to families, emphasizing healthy and sustainable food systems.

For the last eight years, Asmakam Life University has been quietly driving self-awareness and life-oriented learning among thousands of parents and children. Its vision is to create a sustainable and wellness-oriented community with co-creators who share this passion.

Currently, the university is taking shape on a 15-acre farm, featuring a permaculture-based food forest and natural residential spaces. This farm reflects their commitment to building a lifestyle centered on harmony with nature and conscious living.

Cyber Security Awareness



Mr. Rajesh Dandotiya
ADCP of Police, Crime
Branch, Indore

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Abstracts

Enhancing Statistical Language Modelling and Lexical Analysis Using Sanskrit's Linguistic Framework

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Many Indian languages can trace their ancestry back to Sanskrit, the oldest language known to man. It is essential to represent information in a native language since the linguistically divided population is adjusting to new technologies. This has prompted several forms of study in the field of natural languages aimed at improving the process of translating spoken or written languages into English. It is easier to map translation procedures for other dialects or language understanding algorithms when Sanskrit is inherited with the linguistic hierarchy of grammar formulation. The extensive vocabulary of Sanskrit makes its grammatical validations and lexical analysis reliable research. Sanskrit grammar made it easy to evaluate vernacular languages from a semantic perspective by analyzing their morphology and lexicon. The current approaches to statistical language modeling using Sanskrit are summarized in this article. This paper lays out the entire procedure for extracting expressions and rationally deducing phrase grammar rules. Statistical modelling theories are the main subject of the article, which also offers suggestions for improving the grammar's precision.

Keywords: Syntactic, Semantic, Government and Binding (GB), Lexical Functional Grammar (LFG), Morphology, Context Free Grammar (CFG).

Plant Disease Detection Using DenseNet169

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Infected plants have a great deal of impact on any country's economy. Normally, farmers and agricultural professionals keep a keen eye on these crops for detection of this disease. However, this process is often time-consuming, very tedious and almost imperfect. The growth of plants and their well-being is very important for farmers' growth, it directly affects their economy too. Traditionally, plant disease detection is carried out by observing various spots on affected plants. The main objective of this study is to implement a robust model for recognition of diseases which classifies disease on basis of leaf images. Convolutional Neural Network(CNN) algorithm called DenseNet169, is used to recognize plant diseases also with the help of Plant Village Dataset taken from TensorFlow. A CNN is a type of neural network that's usually accustomed to analyzing pictures. It consists of numerous layers, every of that performs an operational convolution on the input data (thus the name "convolutional") This method adapted is segregated into two phases. In the first phase, the input image is loaded, and segmentation algorithms are applied to detect parts of the plant that have been affected by diseases. To extract features from CNN model, we use Feature Extraction. Afterwards, we need to train the CNN network with last sigmoid/logistic dense layer with respect to target variable.

Keywords: Convolutional Neural Network, DenseNet169, Image Processing, Computer Vision, Detection of Plant Disease.

Levelling up Health: Unlocking the Power of Gaming in Wellness Fusing DTx

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The fusion of Gaming in wellness or healthcare with Digital Therapeutics or DTx is emerging in the today's world. The problem statement captures the game-changing potential to merging gaming and DTx to offer or enhance innovative solutions for personal health. DTx is a software-based treatment or intervention designed to treat medical conditions based on the patient's evidence. In scenarios like managing calcium intake to prevent kidney stones, these solutions actively promote patient engagement in monitoring and improving their dietary choices. The creative approach of fusing Gaming with DTx in this tech-driven world uses gaming features to boost the overall patient's well-being. By employing the preceded mentioned method, we gain insights into maintaining a healthy balance of calcium intake, effectively mitigating the risk of developing kidney stones. Through the integration of gaming and healthcare, our goal is to pioneer inventive solutions that facilitate the enjoyment and effectiveness of health management practices. The current technological landscape incorporates educational components infused with gaming elements on platforms, facilitating users' understanding of nutrition and offering tailored guidance on calcium intake. This approach involves crafting user-centric games with individualized health objectives, amplifying patient involvement. The objective is to revolutionize how people perceive healthcare self-management, rendering it captivating, interactive, and accessible to diverse demographics. This innovative amalgamation holds the potential to revolutionize and prioritize health, not solely by enhancing enjoyment but also by fostering tangible health benefits, paving the way for a healthier global populace. Throughout this paper, we utilize our proposed model, the Therapeutic Wellness Gaming Model (TWGM), to delve into the convergence of gaming and healthcare within the realm of Digital Therapeutics.

Keywords: Gaming, DTx, Calcium Intake, Kidney Stones, Wellness, Machine Learning (ML).

Recent Cyber Attacks in USA and India: A Comparative Analysis

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This research paper conducts a comparative analysis of recent cyberattacks in the United States of America (USA) and India and identifies knowledge gaps in the field of cybersecurity. Both countries have witnessed a lot of cyberattacks targeting critical infrastructure, government agencies, and private enterprises, exposing significant vulnerabilities in their cybersecurity frameworks. The types of cybersecurity domains and threats faced are listed and an effectual analysis of existing cybersecurity measures in mitigating these threats is done. By comparing the strategies used by the USA and India, the research paper examines best practices for enhancing cybersecurity resilience. The findings underscore the need for a coordinated global effort to combat cyber threats and points out the importance of investing in advanced cybersecurity technologies and awareness programs to shield our digital ecosystems as a scope of future.

Keywords: Cybersecurity, Cyberattacks, Ransomware, Threat, Phishing, Cyber Security Body of Knowledge (CyBOK), Hacker One, Distributed Denial of Service (DDoS).

Raw Milk Procurement in Dairy Supply Chain: Analysis of Influencing Factors

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The existing literature does not show enough research studies on dairy milk supply chain. The research work investigates the nature of factors that affect raw milk procurement in a dairy supply chain; the factors have been gathered from the existing literature. The natures of a total ten factors have been analyzed based on the opinions of some experts in the relevant practicing field. Analysis of the data collected has been carried out using the Interpretive Structural Model and further investigated by Cross-impact Matrix Multiplication Applied to Classification (MICMAC). This research categorizes the factors into four classes: autonomous factors, dependent factors, independent factors, and linkage factors. The primary reason behind the classification is to make an identification of the most critical factors determining the maximum impact on the dairy supply chain with reference to raw milk procurement to accord special emphasis on shelf life, safety, and freshness of milk.

Keywords: Interpretive Structural Model, MICMAC, Factors, Milk Procurement, Dairy Supply Chain.

Design and Implementation of Web Scraper for Fact-Checking Website

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Web scraping software automates the extraction of vast amounts of data from websites, streamlining the tedious manual process of copying and pasting information into spreadsheets or other storage formats. For instance, collecting content from websites like Politifact.com manually would require hiring multiple people to visit each page, copy information such as titles, authors, statements, dates, and sources, and then input it into a database. This manual approach could take days or even months to complete. However, web scraping tools can perform this task programmatically, visiting every page and parsing Hyper Text Markup Language (HTML) to extract the required data efficiently. In our research, we utilized web scraping to collect and organize information from Politifact.com, specifically targeting key details like the title, author, statement, date, and source, significantly reducing the time and effort needed for data preparation.

Keywords: HTML, BeautifulSoup, Parsing, Social Media.

Decoding Viewer Reactions: Sentiment and Emoji Analysis on YouTube

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In the modern digital era, YouTube comments are not only words, but they show the sentiments of the viewers with lots of insights. This paper uses YouTube Application Programming Interface (API) to analyze comments and extract valued information about viewer sentiments. The present study helps content creators, marketers, and decision-makers understand the audience's reaction to the specific video(s). The exploratory data analysis has been conducted to reveal the user engagement pattern, emphasizing sentiment analysis, usage of emojis, and trending tags. The dataset used for the research focused on a motivational video that highlights the emotional influence of content and the part of emojis in the engagement of viewers. The emoji expressions and trending tag analysis have been standardized to have an inclusive view of the dynamic environment of YouTube. This paper bridges the gap between content creators, promoters, and researchers, and also makes them capable of strategy optimization to improve user experiences depending on decoded sentiments and user interactions on this comprehensive platform.

Keywords: YouTube Comments, Sentiment Analysis, User Engagement, Emoji Analysis, Trending Tags Analysis.

Prediction of E-Commerce Shopper's Purchasing Intention Using KNN Algorithm

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An e-commerce web site is very much effective for visitors to buy on-line shopping achieving a high conversion rate which added a new explosion in the business sector. People tend to explore online for finding the items they need and buy in real time. For this companies use different machine learning algorithms to find the user behaviour and interest about the products. There are so many algorithms such as regression, Random Forest, Decision Tree, k-Nearest Neighbour Algorithm (KNN), Naive Bayes, Support Vector Machine (SVM), Logistic regression to predict whether a customer visiting the webpages of an e-commerce shop also show they will purchase or not. The analyzing in real time predicts the history of customers shopping. In this paper we take a dataset of e-commerce purchasing and apply a KNN algorithm to find out the purchasing intention of customers. We are also discussing the top companies using machine learning to generate revenue and analyze their data for better prediction.

Keywords: KNN, Supervised Learning, Machine Learning, Natural Language Processing.

Machine Learning Techniques on Mobile SMS Spam Detection

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Unsolicited mass Short Messaging Service (SMS) or fraudulent SMS delivered to people or organisations are known as spam. To prevent data breaches and invasions of privacy, spam texts must be recognized and eliminated. Scholars are consistently investigating machine learning approaches and strategies to efficiently distinguish and categorise spam SMS from authentic ones, often known as "ham" SMS. Researchers have built systems that can accurately classify SMS as spam or ham by analysing numerous textual elements. This study assesses the accuracy of several classification techniques in identifying spam from valid sms by analysing data gathered from multiple sources. short message service are filtered and categorised using Natural Language Processing (NLP) algorithms according to their content. The Extreme Learning Machine (ELM) is one instance of a machine learning model used for this purpose. ELM is the state-of-the-art feedforward neural network technique with a single hidden layer. ELM avoids overfitting problems and has quick training times compared to standard neural networks. Because ELM only needs one iteration cycle, spam detection using it is both practical and efficient. This paper concludes by reviewing and contrasting a number of machine learning techniques for spam detection, emphasising the efficiency and adaptability of strategies like ELM in protecting against spam sms on a variety of domains.

Keywords: SMS Detection, Spam Detection, Machine Learning, Algorithms Analysis, Natural Language Processing.

A Comprehensive Study of Tactile Education System for Visual Impaired People

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This study examines the tactile education system for individuals with visual impairments, with a particular focus on the Indian context. It evaluates existing frameworks and resources for education, highlighting both advancements and gaps in tactile and sensory-based learning approaches. The analysis encompasses e-learning resources such as audiobooks and Braille displays, as well as government and nonprofit initiatives within the Indian education system. The challenges faced by visually impaired individuals in India are explored, including limited access to technology, socioeconomic barriers, and a shortage of trained educators. Through stakeholder interviews and a thorough literature review, the article proposes strategies to enhance educational experiences. These strategies emphasize the integration of advanced technologies, the formulation of inclusive policies, and the improvement of teacher training. The aim of this research is to inspire innovative ideas in tactile learning and to advance the dialogue on inclusive education.

Keywords: Tactile Education, E-Learning Tool, Visual Impaired People, Braille Language, Challenges.

Green Computing and Sustainability: Legislature's Perspective

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Climate change is a serious concern for all living beings and states. The Right to life and the Right to development are both integral for human beings. Development in technology is a necessity but it also raises concerns for its impact on the environment. Handling, recycling, and reusing e-waste has been promoted over the last few years at different levels worldwide. However, we still need to find more solutions to reduce the waste generated by the development of technologies and its consequences. From this arises the concept of sustainable computing also termed Green technology or green IT. Green computing focuses on the use of technology keeping in mind its impact on the environment and thus Sustainability comes into the picture. This paper analyzes the concept of Green computing, its impact on the environment, green computing implementation in India, challenges, regulations, and suggestions.

Keywords: Green Computing, Electronic Waste, Technology, Sustainability, Environment.

Space Debris: Challenges and Legislation for Sustainable Space Exploration

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The space exploration had seen a rapid boost in the past years because of the swift advancement of technology. This has resulted in the congestion of the most used orbits i.e. “Low Earth Orbit and Geostationary Orbit” with satellites. The paper relies upon secondary data and has analyzed space debris statistics and space treaties to study the threat that hinders future space exploration posing a risk of cascading effect known as Kessler Syndrome. Though they are international space treaties regulating space missions but they are not compatible for the present needs due to their non-binding feature. The paper explores mitigation strategies including collision avoidance and satellite reentry techniques, use of graveyard orbit to reduce space junks. Also, the paper recommends establishing space tribunal, scrapping outdated laws and opting for multi-mission satellites to ensure sustainability of space exploration.

Keywords: Space Debris, Low Earth Orbit, Geostationary Orbit, Operating Satellite, Orbiter Velocity.

Technological Advancement in Criminal Law

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Technological advancement has dramatically reshaped criminal law and law enforcement, presenting both opportunities and challenges. This paper explores the evolving role of technology in policing, investigating its benefits and limitations in enhancing law enforcement capabilities. It examines how technology modernizes public services, aids in crime detection, and improves efficiency within law enforcement agencies. The integration of cutting-edge tools such as Artificial Intelligence (AI), surveillance systems, and wearable technology is analyzed for its impact on crime prevention and operational effectiveness. The paper also delves into the legal challenges posed by rapid technological progress, including privacy concerns, data protection issues, and jurisdictional complexities in cyberspace. Additionally, it addresses the advancements in forensic science, emphasizing improvements in DNA analysis, digital forensics, and forensic toxicology. Through case law analysis, the paper highlights recent judicial perspectives on electronic evidence and its admissibility in courts. Ultimately, it underscores the need for a balanced approach to integrating technology into criminal law, ensuring both enhanced crime-fighting capabilities and the protection of fundamental rights.

Keywords: Technological Advancement, Law Enforcement, Artificial Intelligence, Surveillance, Privacy Concerns, Data Protection, Forensic Science, Cybercrime, Jurisdictional Issues, Electronic Evidence.

Relational Database Performance Optimization Techniques

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Over time, relational databases remain an important part of today's statistics management notwithstanding the need to maximize efficiency in order to improve its rate of data retrieval. This review looks at ten influential papers that explore various aspects to do with performance enhancements. We discuss structures that take into account hardware characteristics, ask about optimization methods, and consider the indexing algorithms to minimize processing time and resource utilization. The impact of value-based overall optimization, database segmentation, and materialized view selection on the query executing performance is also examined. This brief review delivers a systematic evaluation of Relational database overall performance optimization approach of the current literature, focusing on the set of techniques that may well enhance database scalability and reaction time in numerous applications.

Keyword: Relational Databases, Performance Optimization, Indexing, Query Optimization, Cost-Based Optimization, Materialized Views, Database Partitioning, Hardware-Aware Optimization

Maximizing Cloud Security: Synergistic Approaches to Multi-Factor Authentication Deployment

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Cloud computing has transformed traditional IT infrastructure, offering dynamic, configurable resources on demand. On the other hand, it brings unique cybersecurity challenges, particularly in protecting sensitive data from unauthorized access. Traditional single factor authentication does not address these risks. By implementing Multi-Factor Authentication (MFA), which combines several factors for verification including password, tokens, and biometrics, this cloud security method has become increasingly popular. Existing authentication methods fall short in the cloud environment, so this paper presents a novel multi-factor, multi-layered cloud access authentication framework. The methodology for MFA implementation uses risk-adaptive authentication based on real-time risk assessment, adaptive policy for MFA selection, and seamless verification workflows for end-users. Moreover, the implementation of the advanced technologies that cover all aspects such as encryption, SSO, and adaptive authentication further safeguards it against evolving threats. Through experimental analyses, we show that the framework is effective to substantially reduce the vulnerabilities without compromising usability and scalability. This will help cloud service providers and organizations alike better equip themselves with an effective and agile security environment through the adoption of next generation MFA strategies.

Keywords: Multi-factor Authentication (MFA), SSO, Vulnerability, Encryption

Parametric Optimization of Hall Effect Using Flower Pollination Algorithm and Cuckoo Search Optimization Techniques

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Developing a precise model for Hall effect using experimental statistics is crucial for managing, simulating, and optimizing Hall coefficient of Hall effect devices. In this work, two powerful optimization techniques such as Flower Pollination Algorithm(FPA) and Cuckoo Search Optimization(CSO) are utilized to estimate Hall co-efficient of Hall effect study. Additionally, accurately anticipate the Hall effect's I-V characteristics validating the suggested approach. Three criteria were selected in order to conduct a comparison analysis between these two algorithms, specifically: RMSE, convergence speed, and computation time. Based on the results, it was determined that FPA performed unparalleled with regard to less computing time, convergence speed, and least RMSE.

Keywords: Hall Coefficient, FPA, CSO, Optimization, RMSE.

Being Inclusive With Neurodiverse Workforce and Technology in Training

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An emerging area of research examines the experiences and contributions of neurodiverse individuals, particularly those with autism spectrum conditions, in educational and workplace environments. This study synthesizes findings across studies to elucidate key aspects related to the inclusion of neurodiversity in organizations. Having diversity and inclusion sets in top agenda of all global organisations of today. It is said that neurodiverse population is over 5% among the employable population (Deloitte 2022). Inclusive workforce cannot be built if this segment is not hired not trained and included in the mainstream jobs. Several studies showcase the benefits of workplace accommodations for neurodiverse employees. Adjustments such as quiet workspaces, written job instructions, and noise-cancelling headphones allow individuals to minimize sensory overload. Reviews emphasize that customized supports boost job satisfaction, performance, and retention. This review creates a foundation for future inquiry by surfacing cross-cutting challenges and opportunities in current empirical work. It demonstrates the need for ongoing research and translation of findings into practice to drive meaningful progress in neurodiversity inclusion. With appropriately supportive conditions, organizations can tap into the innovations neurodiverse perspectives bring. The study presents a few best practices that can be adopted by industries across the globe. Technology base training is proposed to be the pathway to the neurodiverse inclusive workplaces.

Keywords: Training, Technology, Neurodiverse, Workforce, Metaverse, Inclusion, Workplace, Diversity.

A Condensed Overview of Robotics With Artificial Intelligence

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Robotics has its share of success stories as well as frustrating ones. The robotics era is upon us in the twenty-first century. For a long time, robots have held the promise of new possibilities. In today's world, robots play a more and bigger part in every facet of life, including healthcare and medical, construction services, food production, supply chain management, and transportation. Modern robotics is a major technological advancement; from medical research to other scientific fields, robotics is now a major part of science. The robot is performing precise and difficult tasks with ease and without suffering any damage. Robots are becoming the primary symbol of human cooperation in today's globe. An overview of the dynamic junction of robotics and artificial intelligence, as well as how it affects organizational and economic dynamics, is provided in this article. We examine the emerging research areas in economics and management that investigate the complex effects of these state-of-the-art technologies. Utilizing the many methodologies employed by researchers in this domain, we offer discernments regarding the consequences of automation, robotics, and artificial intelligence on corporate strategy and organizational architecture. We highlight attractive directions for future research endeavors and urge organizational and strategy researchers to become more involved and attentive in these domains.

Keywords: Collaboration in Robotics, Human Cooperation, Manufacturing, Transportation, Artificial Intelligence.

Review on Network Slicing Optimization: A Machine Learning Perspective

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Investigating how network slicing affects resource allocation and management, the paper explores methods for optimizing network resources in response to current demand and traffic trends. The effect of network slicing on Quality of Service(QoS) measurements is also examined, along with the ways in which different applications and consumers might receive distinct services inside the same infrastructure. Additionally, examined is how edge computing and cloud-native architectures enable network slicing features, emphasizing how crucial they are to providing high- bandwidth and low-latency services. The study also addresses the legal structures and regulatory issues that control the implementation and functioning of network slicing in 5G networks. It emphasizes the need for standardized interfaces and protocols to enable interoperability between different network slices and ensure seamless integration with existing network infrastructures. It advocates for the importance of continued research and development efforts in Artificial Intelligence (AI), Machine Learning (ML), and security to realize the promise of network slicing as a key enabler of future digital ecosystems. In conclusion, the paper underscores the transformative impact of network slicing in unlocking the full potential of 5G networks for diverse applications and industries.

Keywords: AI, ML, QoS, Network Slicing, Software Defined Networking.

Improved Road Traffic Congestion Prediction Using Machine Learning Through Modified Index

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Accurate traffic congestion forecasting is an indispensable element of urban transport systems. This paper suggests a machine learning model to predict rush-hour traffic congestion using a newly defined Traffic Congestion Index (M_TCI), incorporating traffic density as a crucial factor for congestion prediction. This study uses XG Boost algorithm with spatio-temporal and contextual features such as holidays and seasonality to enhance the model's accuracy. The model focuses on long-term prediction, incorporating the day of the week, time, holiday and seasonality to predict daily road network performance. Results show that the model outperforms ensemble models- CatBoost, Gradient Boosting Machine (GBM) and LightGBM and achieves an accuracy of 90%. XGBoost performs better in handling large and high- dimensional datasets, making it a valuable tool for predicting traffic congestion and optimizing urban road networks.

Keywords: Congestion Prediction, Modified Congestion Index, Temporal Features.

A Novel Bilateral Recurrent Network Approach for Robust Rain Streak Removal

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Rain streaks in outdoor images are a challenging problem for computer vision applications, including but not limited to autonomous driving, surveillance video monitoring, and remote sensing. Streaks in the image tend to reduce its quality and, as a result, can affect identifying, tracking, and determining objects. Traditional methods for image deraining are not suitable for real-world applications because of sub-optimal performance. Even with the optimization-based methods and crafted priors, the traditional approach often removes the rain streaks & image details. Practically, majority methods fail to differentiate rain streaks from unadulterated images, which leads to image degradation and loss of detail. Image-aware deraining methods provide improved accuracy and image quality. Convolutional Neural Networks (CNNs) are effective in single-image rain streak removal using deep learning mechanism. However, the methods of Deep Neural Networks (DNNs) often struggle to accurately model real-world conditions, as they tend to obscure the rain patterns against the background. Moreover, the traditional methods have high computational costs. This paper solves the single-image deraining problem by introducing the Bilateral Recurrent Network (BRN). The BRN integrates recurrent with the Bilateral Long-Short Memory cells to use the temporal and pattern information of the rain patterns. Experimental results on the datasets show BRN exceeds prior-dated works in single-image deraining. This report comprehensively evaluates the BRN model, implementation, and experimental evaluation, showing that the model is a solid, real-world solution for single image deraining.

Keywords: CNN, Machine Learning, BRN, BLSTM, Deep-Learning.

Implementation of Digital Twin Technology for Predictive Crop Disease Monitoring

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With the population of animals and humans cultivating rates of crops and plants are increasing. Thus, demand also increases. The science of agriculture innovates several techniques to improve the cultivating sector to improve production. When it comes to production there is harvesting losses are considered. During cultivating farmers face problems like diseases and insects which aid production rate decreases and ultimately increase the rate of those crops. For several years science agriculture tried to make a quick medication system for detecting plant disease. For this problem, we come up with a solution that features a combination of hardware and software-created models that help to predict diseases. Crops like potatoes and tomatoes are an everyday need in Indian homes. From few years rate of potato and tomato are goes high. To prevent these losses and deal with this problem this paper uses the digital twin concept which creates a replica of a farm and which works with yolo to cure.

Keywords: Machine Learning, CNN, Digital-Twin, Precision Farming, Early Prediction, Azure Platform.

Optimizing Flower Classification Models: A Comparative Analysis of Bayesian Optimization and Random Search for Hyperparameter Tuning

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Understanding plant varieties, ecosystem health, and agricultural methods are made easier with the help of flower categorization, which is essential to botanical study, environmental monitoring, and agriculture. The effectiveness of automating flower classification has been greatly attributed to recent developments in machine learning, particularly in deep neural networks. But in order to maximize model performance, hyperparameter optimisation is crucial. By utilising state-of-the-art hyperparameter optimisation approaches, this research seeks to improve the precision and efficacy of floral categorisation systems. The work addresses issue such dataset anomalies, such as photos of flowers in unusual locations, by utilising a Kaggle dataset with 104 flower species. In order to maximise the macro F1 score—a crucial metric for multiclass classification—the study contrasts random search versus Bayesian optimisation for hyperparameter tweaking. The study obtained an F1 score of 0.966 with random search using the Swin Transformer model, as opposed to 0.9285 with Bayesian optimisation. With batch sizes optimised for TPU utilisation, the dataset was divided into 77.46% for training and 22.54% for validation.

Keywords: Flower Classification, Swin Transformer, Random Search, Bayesian Search, Hyperparameter.

A Detailed Analysis of Modern Load Balancing Methods in Software Defined Networks

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In these days of smart technology, the use of internet-connected devices has increased dramatically. This has led to a sharp rise in online activity. The necessity to manage a single server with several clients, which might lead to Denial of Service (DoS) assaults, restricted service availability, and issues with network scalability are only a few of the negative effects of the growing traffic. A solution that has been proposed in the literature to handle these issues is to utilize a load balancer in combination with many servers. Research indicates that load balancers do have a few disadvantages despite being widely used. Among these include the fact that they are exclusive to one manufacturer and cannot be programmed. Software Defined Networking (SDN), emerged as a paradigm shift to address these issues and the resulting spike in internet traffic. SDN enables programmable load balancers by granting customers the autonomy to create and employ custom load balancing algorithms. This inquiry aims to investigate SDN and OpenFlow from the ground up, with a particular focus on how they impact load balancing. This paper compares several SDN load balancing approaches based on open research questions, suggested fixes, and potential future paths. Smart load balancing methods for SDN are often designed using mathematical models and simulators. Furthermore, this paper describes in detail the key performance metrics for these algorithms.

Keywords: Software Defined Network, Dynamic Load Balancing, OpenFlow, Network Function Virtualization, Denial of Service.

An Empirical Study on Various Word Sense Disambiguation Techniques in the Biomedical Domain

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Word Sense Disambiguation (WSD) in the biomedical domain is a composite task that involves establishing a correct meaning of a word based on its explicit context within biomedical literature. Basically, biomedicine literature, constitutes research papers, clinical reports, electronic health records and pharmaceutical articles. All these sources of biomedical literature are rich with terminology that often has numerous meanings. This in turn leads to the uncertainty in drawing an accurate meaning to a word present in the biomedical text. This polysemy introduces a challenge, as the accurate connotation of such terms is important for various subsequent applications that includes information retrieval, text mining, and knowledge extraction. The vagueness in word meanings of a biomedical text can lead to misunderstandings or increased errors in biomedical data analysis, thus influencing clinical decision-making, research outcomes, drug discovery and patient's treatment. Therefore, a technique for WSD is required to ensure that the computational systems can precisely process and analyze biomedical literature, that forms a base to more reasonable and fruitful insights. This paper introduces an in-depth investigation of the challenges that are associated with WSD in the biomedical domain. This investigation includes the structural complexity of medical language, the demand for domain specific knowledge, and the drawbacks of existing Natural Language Processing (NLP) techniques. In addition to this we discuss the relevance of WSD in improving the accuracy and efficiency of biomedical data analysis. This study includes several methods, from the fundamental rule-based approaches to more advanced machine learning and deep learning models, that are evaluated for their productiveness in addressing WSD challenges in biomedical texts. After conducting an empirical study, the findings showcase the effectiveness of BERT model over other machine learning models for the classification problems. Our study also includes exploration of various research that have undergone in this area as well as applications of WSD in biomedical domain.

Keywords: Word Sense Disambiguation (WSD), Natural Language Processing (NLP), Long Short Term Memory (LSTM), Support Vector Machine (SVM), Convolutional Neural Network (CNN).

Effective Security Analytical Enhancement for Cross-Site Scripting and Code Injection Vulnerabilities in Web Security

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SQL injection and Cross-Site Scripting (XSS) have emerged as significant security vulnerabilities in contemporary web applications, eclipsing buffer overflow weaknesses, as indicated by recent vulnerability and exploit reports. Both SQL injection and XSS exemplify a broader category of input validation deficiencies. This research aims to investigate these vulnerabilities comprehensively while proposing a user-centric architecture to guarantee secure data transmission. This paper particularly examines a model that offers a framework for both symmetric and asymmetric encryption techniques, demonstrating greater reliability than traditional encryption methods.

Keywords: SQL Code Injection, Cross-Site Scripting, Cybersecurity.

Analyzing CNN Applications in Lung Cancer Detection and Diagnosis: Advancements, Challenges, and Future Prospects

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Convolutional Neural Network (CNN) demonstrated significant potential in lung cancer recognition and identification through the analysis of medical imaging data. This abstract shows brief of the progress, challenges, and future application of CNN in this domain. CNNs have shown remarkable capabilities in accurately identifying lung nodules and distinguishing between benign and malignant lesions using data from different imaging techniques for example CT scans and X-rays. Lung cancer patient prognosis, prediction and early detection have improved as a result of their capacity to recognize intricate patterns and features in images. Despite their successes, CNNs face several challenges in lung cancer diagnosis. Unpredictability in image quality, size, and resolution, as well as presence of artifacts and overlapping structures, pose significant obstacles to accurate detection and classification. Addressing these makes collective efforts from clinicians, researchers, and technologists. Additionally, advancements in explainable AI method will develop the interpretability of CNN-based diagnosis, fostering trust and acceptance among healthcare professionals. In conclusion, CNNs offer invaluable opportunities for improving lung cancer detection and diagnosis. Overcoming existing challenges and capitalizing on future opportunities will drive the development of more efficient and accurate CNN-based approaches, ultimately benefiting lung cancer patients and healthcare providers.

Keywords: Deep Learning (DL) Techniques, Convolutional Neural Networks (CNNs), Histopathology, Lung Cancer Detection, Medical Image Analysis.

Enhance Learning Capabilities of Students Using Gamification at University Level

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Many student classes had to be moved online due to the global pandemic of 2020, and many teachers started teaching online without much to no preparation for best practices. The customization of educating children was harmed, and teachers soon found that it was hard to engage and communicate with kids. student involvement is a catalyst for improved student performance and is lower in a virtual environment than in a face-to-face one. Additionally, students are often less motivated in online situations. To increase student involvement in online learning, a variety of teaching strategies were created (e.g., flipped learning model, blended learning, etc.). Recently, many researchers and practitioners have paid considerable attention to gamification. We applied a new approach for the gamification of education is described in two sections serve and conceptual and find the benefits and challenges with the connection between machine learning and gamification at final result and analysis report is generated. This approach can help motivate students to want to learn.

Keywords: Flipped Class, E-Learning, Blended Learning, Online Learning, Gamification.

A Comparative Analysis of DBSCAN, K-Means and Agglomerative Clustering Algorithms for Geospatial Data

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This study presents a comparative analysis of three popular clustering algorithms, Density-Based Spatial Clustering of Applications with Noise (DBSCAN) and KMeans, Agglomerative Clustering applied to geospatial data. We focus on their performance based on the silhouette score, examining their ability to identify meaningful clusters in noisy data. Our results show that DBSCAN outperforms KMeans and Agglomerative Clustering, achieving a silhouette score of 0.8646 compared to KMeans' 0.8160 and Agglomerative Clustering's 0.8160, highlighting DBSCAN's robustness in identifying clusters with irregular shapes and handling noise.

Keywords: DBSCAN, Non-Negative Matrix Factorization(NMF), Singular Value Decomposition (SVD), Root Mean Square Error (RMSE), K-Nearest Neighbor (K-NN), Deep Neural Network(DNN), Multilayer Perceptron (MLP).



Comparative Analysis of Machine Learning Algorithms for the Prediction of Student's Learning Style

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The prediction of student learning outcome is one of the focused areas of research to enhance the personalized learning of student fraternity. It is very essential to know the various learning approaches such as visual, auditory or kinesthetic to enhance the teaching methods adopted and to boost the student involvement. Machine learning algorithms can play a vital role in predicting the students' learning preferences. This study presents a comparative analysis of machine learning algorithms for predicting students' learning styles by means of logistic regression, K-Nearest Neighbor (KNN), and naive Bayes algorithms using a publicly available dataset. The performance of each algorithm is evaluated using metrics such as accuracy, precision, recall, and F1-score. The results of the study show that the logistic algorithm outperforms the other algorithms, achieving an accuracy of 96.7%. However, KNN and naive Bayes algorithms also provide reasonably accurate predictions with an accuracy of 85% and 83.1%, respectively. The study concludes that machine learning algorithms can be effective in predicting students' learning styles.

Keywords: Logistic Regression, K-Nearest Neighbor, Naïve Base, Learning Style.

Estimating Software Security of a College ERP System: A Case Study Using Software Product Security Framework Approach

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Security is a major concern for business applications. With the intertwined dependencies of various security measures to secure an enterprise application, security must be included in the development process since its inception, i.e. from requirements gathering till the operation of the software. Various security controls are available to secure process as well as software product. Security consideration during the development process can lead to secured software. It can be supported by the help of security framework that considers security at managerial level, design and development. The capability to measure the security efforts throughout the development process may help to judge the overall security of the software. In this paper, we provide an emergent tool to analyze security efforts, and controls are integrated while developing secured software system. The Security Factor shall facilitate the development team to identify security efforts during the development of software using Software Product Security (SPS) framework. It shall also support in determining the improvement areas for secured software product development process.

Keywords: Software Security, Software Product, Security Framework, Security Factor.

Exploring the Role of Artificial Intelligence in Image Forgery Detection and Prevention: A Focus on MD5 and Open CV

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The problem of ensuring the authenticity of visual content is becoming much more pressing in such a rapid proliferation of digital media, when image forgery techniques become ever more sophisticated, more reliable methods for achieving this are required. This paper discusses a holistic approach to detecting image forgery by combining cryptographic methods with a new set of artificial intelligence (AI) methods. Several limitations of traditional detection methods such as error level analysis (ELA), which depends on the invariance of spatially local distributions within individual blocks, are examined concerning the detection of complex manipulations. We rely on cryptographic approaches to achieve high integrity verification by identifying alterations through MD5 hashing of unique hash comparisons. Further, the study employs open source contributions of advanced image analysis such as texture, color profiling, and shape recognition to discover inconspicuous irregularities in such tampered images with OpenCV. Other AI driven models including Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs) and Vision Transformers (ViTs) further contribute to the achievement of forgery detection by leveraging multi scale feature learning, temporal analysis and self-attention. The proposed method combines MD5 hashing with these advanced AI techniques to achieve a dual layered approach for enhancing detection accuracy and adaptability to various manipulation methods including deepfake, splice, and copy move type forgeries. The proposed system is demonstrated experimentally, with significant improvements in detection accuracy and robustness over traditional methods shown. Providing a scalable and adaptable framework for preserving the integrity of digital visual content in an environment with an evolving landscape of digital manipulation, this research provides a rich set of insights about cryptographic and AI techniques integration.

Keywords: CNN, RNN, ViTs, LSM, Hash, ELA, ResNet-50, Deepfake, GRU, GAN.

Importance of Addressing Complexity Factors to Improve Project Success Rates and the Overall Effectiveness of Software Development

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Software development is a complicated process that is critical to improving technology and promoting business innovation. Project management methodologies, team dynamics, stakeholder participation, technical innovations, and organizational context all impact success. Despite high standards in these areas, many projects encounter difficulties such as missed deadlines or cost constraints. To address these concerns, this study looks at team performance and overall project success in Sri Lanka's fast-growing IT sector. The study used a mixed-method approach to determine complexity features by analyzing quantitative data from the Kitchenham, Maxwell, and Desharnais datasets. To identify essential factors influencing project outcomes, the Lasso feature selection method was applied. Fuzzy logic was utilized to develop and test an ensemble classifier that demonstrated exceptional accuracy, particularly on the Kitchenham dataset, where it achieved the lowest Root Mean Squared Error (0.2707) and the highest R-squared error (0.9308). The findings highlight the importance of addressing complexity factors in order to improve project success rates and overall software development effectiveness, and they propose that sophisticated techniques such as fuzzy logic-based cost estimation can significantly improve the accuracy and reliability of software project predictions.

Keywords: Software Development, Cost Estimation, Project Factors, Project Outcomes.



Automatic Answer Evaluation System Using Keyword Matching Approach

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Automatic answer evaluation is a challenging and efficient approach for answer extraction from a text corpus. In this paper, we describe the method of automatic answer extraction using keyword matching. The pre-processing to the answer involves lowering the case and splitting it into words, and then counting the number of matched keywords in the answer. We have tested the proposed method on the dataset of answers and keywords and show that the proposed method indeed identifies the correct answer when the numbers of matched keywords are more.

Keywords: Answer Evaluation, Keyword Matching, Tokenization, Natural Language Processing.

Social Media Image Classification and Effect of Features Used on Classification Performance

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User-generated contents drive social media platforms. Users share heterogeneous data types, i.e., text, image, and video. Among them, a significant amount of data has been posted in image format. Therefore, analyzing and classifying social media-based images have many essential applications. In this paper, we are addressing the issue of social media-based image classification. Social media images have different characteristics than the normal images used in other applications. To simulate this issue, in this paper two scenarios of the experiment have been demonstrated. First, the experiment utilizes three variants of deep learning models to traditionally classify image data. Additionally, the second experiment includes image classification based on textual and visual features. This model is developed using a deep learning concept namely multi-model feature fusion. The implemented models are experimented with a publicly available social media MEME image dataset, which is obtained from Kaggle. Based on the results, we found that only image-visual feature-based classification provides 43% accuracy. On the other hand, when we utilize both textual and visual features of images using the multi-model fusion. Then the classification accuracy has been improved up to 2%. Thus, shortly for social media image classification the multi-model future fusion techniques are recommended to use.

Keywords: Social Media Data, Social Media Images, Feature Selection, Local Features, Deep Features, Image Classification.

Empowering Precision Agriculture: A Deep Learning Comparison for Rice Disease Detection

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Rice crops in India face significant threats from diseases caused by bacteria, fungi, and other pathogens, which lead to considerable crop losses. Traditional methods for detecting these diseases rely on manual inspections, which are time-consuming, prone to errors, and require expert knowledge. Given the vast agricultural areas and a shortage of specialists, these conventional approaches are inadequate for effective disease management. This study proposes an automated detection system using the ResNet-50 Convolutional Neural Network (CNN) model with a transfer learning approach to classify rice leaf diseases accurately. Utilizing a real-time dataset from the Raipur region with six disease classes, ResNet-50 achieved high performance, with a training accuracy of 99.71% and a testing accuracy of 97.57%. In contrast, a VGG16 model achieved a lower testing accuracy of 91.63%. Our results demonstrate that ResNet-50's deep learning capabilities make it a highly effective tool for accurate disease identification, potentially transforming rice disease management practices.

Keywords: CNN, Deep Learning, Fine-Tuning, Rice Leaf Diseases, Transfer Learning.

A Hybrid Approach for Biomedical Question Answering: Combining Sparse and Dense Retrieval With LLM-Based Reranking

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Biomedical question-answering systems typically involve retrieving relevant documents and then reranking them based on their relevance to the query. Traditional sparse retrievers, like BM25 often fail to capture semantic relationships. While the dense retrievers address these limitations, they can also miss relevant documents due to short queries, vocabulary mismatch, and document specificity issues stemming from embeddings. To address these types of challenges, we propose a hybrid approach that consolidates the strengths of both sparse and dense retrieval methods, resulting in better performance. This ensemble approach generates a comprehensive list of candidate documents, which is then passed through a LLM-based reranking model named ColBert, a fine-tuned late interaction mechanism that works on document relevance to refine the ranking of the documents. We use the Flan-T5 answer generation model to produce a final answer to the query. The experiments were performed on the BioASQ dataset, which remarkably demonstrated the effectiveness of our approach and showcased its ability to improve retrieval performance.

Keywords: Biomedical Question Answering, Large Language Models (LLMs), Natural Language Processing, ColBERT Reranking.

Applying Machine Learning Techniques to Estimate Post-Mortem Interval From Decomposition Stages

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Forensic investigations rely on precise estimations of the Post-Mortem Interval (PMI). Conventional approaches that rely on external factors to determine decomposition accuracy—such as body temperature, livor mortis, and rigor mortis—are notoriously flawed. This research explores the use of machine learning algorithms to forecast PMI by examining different stages of decomposition, environmental conditions, and biological markers. This study investigates various machine learning models, including decision trees, random forests, support vector machines (SVMs), and artificial neural networks (ANNs), using datasets from controlled decomposition scenarios. Machine learning techniques, especially neural networks and random forests, outperform traditional forensic methods when it comes to PMI estimation, according to our results. The random forest model outperformed the others with an MAE of 4.5 hours, indicating its superior accuracy. The most important parameters that emerged as predictors were microbiological data and environmental factors like humidity and temperature. By tackling the problems caused by environmental variability and offering a more consistent and efficient method to PMI calculation, this study demonstrates the potential of machine learning in forensic science. The goal of future research is to strengthen the models and increase the variety of data sources available for use in practical forensic investigations.

Keywords: Forensic Entomology, Deep Learning, Neural Networks, Regression Models, Image Processing, Time Series Analysis, Big Data, Automated Forensic Analysis, Data-Driven Forensic Science.

A Systematic Review of IoT Middleware Frameworks: Investigating Architecture, Implementation and Performance

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As the Internet of Things (IoT) environment keeps growing, there is a rising demand for middleware solution that can help in connecting devices in a way that is both efficient and reliable. Due to the diverse nature and capabilities of IoT devices and their usage in complex data exchange, middleware framework is a key aspect of the IoT. Also middleware functionalities and services are highly required by a variety of IoT applications. Across the existing literature, very few authors have discussed about underlying architecture of IoT middleware, the challenges of implementing them, and how well they perform according to their application requirements. This review paper aims to investigate the architecture, implementation, and performance of existing IoT middleware frameworks, emphasizing on their suitability across diverse application domains. This review can be helpful for the researchers to identify how IoT middleware framework can be improved and in selecting the most suitable Framework according to different application domains for developers of different varieties of IoT applications.

Keywords: IoT, Middleware, Framework, Architecture, Implementation, Performance.

Shape and Texture-Based Insect Pest Detection for Agricultural Sustainability: A Machine Learning Approach

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In agriculture, efficient pest detection is crucial for maintaining crop yields and quality. Traditional methods often rely on manual inspection, which can be time-consuming and prone to errors. To address this, we explored 12 dataset, encompassing 24 classes of crop pests. Leveraging Support Vector Machine (SVM) and a tailored Convolutional Neural Network (CNN) model, we aimed to enhance pest detection accuracy. The research achieved a remarkable classification rate exceeding 92%. The feature selection method plays a crucial role, keeping eye on the efficiency we found out that before feature selection SVM accuracy found to be around 80%, while after carefully choosing the important features the SVM outperformed and the accuracy jumped to 92%. Through rigorous experimentation and cross-validation, our findings highlight the effectiveness of these methods in accurately identifying crop pests, thereby improving pest management strategies.

Keywords: Crop Insect Classification, Machine Learning, Foreground Extraction.

Efficient Multi-Resolution Haptic Rendering for Real-Time Applications

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Haptic rendering is essential for developing immersive virtual environments and providing tactile feedback using computational techniques. This study assesses five haptic rendering techniques multiresolution, image-based, edge detection, Fourier transform, and height map utilizing a varied dataset of surface textures. Performance parameters, including computing time, memory use, signal entropy, and Signal-to-Noise Ratio (SNR), were evaluated to benchmark the methodologies. The multi-resolution technique proved to be the most efficient, attaining the minimal calculation time of 0.7 miliseconds and a low memory consumption of 0.3 KB while preserving a strong equilibrium of signal entropy (4.75) and SNR (5.7 dB). Visual representations of haptic signals emphasize the multi-resolution method's capacity to harmonize computing efficiency with precise and distinct tactile feedback, rendering it exceptionally appropriate for real-time applications in virtual reality, teleoperation, and medical simulations. This study offers a mathematical basis for the selection and optimization of haptic rendering techniques in practical, performance-sensitive systems.

Keywords: Haptic Rendering, Multi-Resolution, Real-Time Feedback, Tactile Interaction, Haptic Signal Processing.

Multi-Scale Deep Learning Techniques for Enhanced Criminal Identification Through Facial Recognition

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Adaptive Multi-Scale Deep Learning (AMSDDL) is introduced to identify criminals through face recognition. AMSDDL enhances the accuracy and efficiency of face detection and recognition in various real-world conditions, including different lighting, angles, and occlusions. To efficiently extract multi-scale information from face images, this system uses a deep learning architecture that dynamically adjusts the size of its convolutional kernel. The system preprocesses the incoming images and video streams by performing tasks such as face alignment, lighting normalization, and cropping to standard dimensions. AMSDDL uses a multi-scale approach to face detection, leveraging specific conditions in the input data to improve recognition rates. The system uses the deep learning architecture of AMSDDL after detecting faces to extract high-dimensional feature vectors based on the faces. For identification, the Weighted Euclidean Distance Metric (WEDM) assigns different weights to different facial features based on their discriminative power for identification. As a result of this metric, the extracted feature vectors more accurately match the features present in the criminal database. Our method outperforms existing state-of-the-art facial recognition algorithms in both speed and accuracy. We process each image in an average of 45 milliseconds and achieve 98.7% identification accuracy, based on experimental results from a broad dataset of more than 50,000 images. The scalability and adaptability of the proposed system make it suitable for widespread implementation in real-time criminal identification applications, giving law enforcement agencies a robust tool for improved security and surveillance. Future efforts will focus on additional optimization and integration of other biometric technologies.

Keywords: Adaptive Multi-Scale Deep Learning (AMSDDL), Convolutional Neural Networks, Facial Recognition, Weighted Euclidean Distance Metric (WEDM).

Enhancing Agricultural Sustainability Through IoT-Based Smart Irrigation Systems: A Review of Soil Monitoring, Water Management and Technological Integration

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Agriculture plays a crucial role in the economy, yet traditional irrigation systems often demonstrate inefficiencies in water usage and control. For centuries, conventional agriculture has been a cornerstone of development globally. This research introduces a novel approach utilizing machine learning algorithms to enhance smart agriculture through an IoT-based smart irrigation system. The new systems should consist of a network of sensors and actuators to collect vital soil data, such as moisture, temperature, and humidity. By integrating artificial intelligence techniques, particularly machine learning strategies, the smart irrigation system aims to effectively control, monitor, and automate irrigation processes. The key objective of such system should be to continuously assess soil moisture content during varying conditions, ensuring optimal irrigation management for sustainable agricultural practices.

Keywords: Smart Irrigation, Machine Learning, Internet of Things.

Securing Medicine Supply Chains Through Blockchain-Based Trustworthy Certification

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The need to protect the integrity and authenticity of medicines is essential in this sector, namely for public health. There are many challenges in the traditional supply chains with counterfeit drugs, data manipulation and lack of transparency being a few. We propose a solution to achieve secure medicine supply chains through Trustworthy Certification using blockchain in this paper. This is done with the help of a permissioned blockchain network, where smart contracts are used to store product registration data, quality checks and results ensured at nodes, ownership transfer information as well as granting viewing permissions only for concrete groups. According to performance data on an eight-core CPU, work is distributed in a uniform manner and can be pushed onto the higher performing cores. High- memory commodity requirement in memory usage graphs, but blockchain manages it well. In addition to this, the system allows for extensive analysis and optimization given detailed supply chain datasets from product specifics, shipping detail down including supplier data. Initial results showed enhanced traceability, security and efficiency of the system opening a door for pharmaceutical supply chains to change from counterfeit-laced phony drug markets into systems that are capable of delivering genuine medication safely up to end consumers.

Keywords: Pharmaceutical Industry, Blockchain, Trustworthy Certification, Medicine Supply Chains, Ownership Transfers.

Boosting Accuracy: Advanced Ensemble Learning Strategies

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Determining how to improve machine learning's predicted accuracy has led to notable developments in ensemble learning techniques. In order to solve prediction problems in a variety of datasets, this study, "Boosting Accuracy: Advanced Ensemble Learning Strategies," explores and applies cutting-edge boosting techniques. Three well-known methods are specifically the subject of this study: Light Gradient Boosting Machine (LightGBM), Extreme Gradient Boosting (XGBoost), and Gradient Boosting Machines (GBM). The advantages and disadvantages of these approaches are carefully assessed over a range of forecast scenarios. Our proposal is to create hybrid models that combine boosting techniques with other machine learning algorithms to create strong ensemble frameworks that go beyond the limits of conventional boosting approaches. The goal of this hybridisation is to get better predictive performance and robustness by utilising the advantages of each distinct model.

Keywords: GBM, Boosting, XG-Boost

Machine Learning-Driven Diagnostic Screening of Cardiovascular Disease via Gut Microbiome Profiling

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Cardiovascular disease remains one of the top causes of morbidity and mortality around the globe, with a growing requirement for innovative non-invasive diagnostic tools. Most established methods of diagnosis suffer from the drawbacks of invasiveness, costliness, and limited access to different settings, particularly resource-restricted ones. Current literature on the gut microbiota has shown promising aspects on being a gold mine source of biomarkers for almost all diseases, including CVD. This study explores a machine learning-based diagnostic approach that uses gut microbiota data to predict the presence of CVD with high accuracy and interpretability. We used the advanced ensemble model LightGBM, given its strength in dealing with high-dimensional data and superior prediction. This model was trained and validated on a very well-crafted dataset comprising gut microbiome profiles with normalization and feature scaling applied for pre-processing to ensure that data are consistent. Model performance is further optimized using hyperparameter tuning, applied via grid search and cross-validation. To improve interpretability, SHAP (SHapley Additive exPlanations) analysis was incorporated, providing detailed insights into feature importance and identifying key microbial taxa, such as *Faecalibacterium prausnitzii*, as significant predictors of CVD. The model's performance was evaluated using metrics such as accuracy, precision, recall, F1-score, and ROC-AUC, demonstrating robust diagnostic capabilities. This work represents a significant leap in precision medicine: it presents a scalable, non-invasive diagnostic approach to CVD based on gut microbiome data. It combines the state-of-the-art predictive modeling with interpretability to bridge the gap between computational advancements and clinical applicability, thus opening up further avenues for innovations in microbiome-based diagnostics.

Keywords: Cardiovascular Disease (CVD), Gut Microbiome, Boosting Algorithms, Non-Invasive Diagnosis.

An Adaptive Hybrid Deep Learning Approach for Human Action Recognition

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Human Activity Recognition (HAR) technology, which is focused on identifying and analyzing human activities, has gained significant interest in recent years. Traditional approaches have employed manually designed features to identify human activities, leading to limited feature extraction. Neural network detectors are increasingly being used in personal and portable devices to detect and recognize human actions. Nevertheless, the current unimodal methods rely on a solitary sensing modality and employ machine learning techniques to identify human activities. In order to address these abstract concepts, a deep learning-based Human Activity Recognition (HAR) model called Adaptive Hybrid Deep Attentive Network (AHDAN) will be created. This model will combine a 3D Convolutional Neural Network (3DCNN) with Gated Recurrent Units (GRU) to enhance the recognition process. Additionally, the parameters of the network will be optimized to improve the recognition process further. Through comprehensive experimental assessments on the UCF101 benchmark dataset, we have established that our proposed method surpasses existing state-of-the-art techniques in action recognition. These findings underscore the capability of our approach to enhance future research in video action recognition. This study presents a novel method for identifying actions in video content. The technique combines attention-based mechanisms with a long short-term memory network and an improved, optimized 3D Convolutional Neural Network to achieve effective action recognition.

Keywords: AI, ML, QoS, Network Slicing, Software Defined Networking (SDN).

Enhancing Yoga Pose Estimation Accuracy Using Optimized Mask R-CNN Model

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Yoga pose estimation is important for fitness, healthcare, and rehabilitation applications, existing models such as AlexNet, Visual Geometry Group (VGG), and ResNet cannot accurately recognize detailed key points or handle complex postures. To tackle these issues, this paper presents an improved mask Region-based Convolutional Neural Networks (R-CNN) with better feature aggregation and segmentation and introduces a key point detection branch. Performance analysis demonstrates the effectiveness of our proposed model by improved values of mAP, AP@0.5, and PCKh@0.5 metrics. This approach has been experimentally shown to be used for real-time recovery from yoga poses. This work pushes forward the accuracy and scalability of pose estimation for widespread fitness and healthcare applications.

Keywords: Yoga Pose Estimation, Optimized Mask R-CNN, Keypoint Detection, Feature Aggregation, Human Pose Segmentation, Real-Time Fitness Tracking.

Emotional Security for Sustainable Future: Multimodal Affective Computing

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Emotional well-being is quite much a significant human resource, which certainly boosts productivity, creativity as well as sustainability. As natural resources get conserved and sometimes preserved, emotional resilience would have to be preserved too against burnout and disaffection from society. One of the contributions by affective computing in this area is early detection of stress, personalized intervention, and even emotion-aware systems for emotional-social harmony among people. This goes in hand with the sustainability goals because it is actively supporting well-being as building blocks for a healthy sustainable future. Reading and comprehending emotions are complicated tasks, but technology aids us in this endeavor. Nowadays, sophisticated algorithms can extract and exploit aspects of body language to identify emotions from a wide range of data sources, such as images, videos, and biosignals. Scientists have been working on developing and analyzing techniques for automated emotion detection and recognition for decades. Extensive literature exists in the subject of emotion recognition, which suggests, evaluates, and estimates many methodologies in fields such as signal processing, machine learning, deep learning, computer vision, and speech recognition. Since the inception of affective computing, there are number of articles published on it. In this paper, we thoroughly examine cutting-edge fusion approaches as part of the review, and then critically evaluate possible performance gains from multimodal analysis over unimodal analysis. To help readers better grab this difficult and interesting study topic, a thorough narrative of these two complementing fields is presented.

Keywords: -Affective Computing, Emotion Recognition, Multimodality, Deep Learning.

Deep Learning Based Rice Plant Disease Detection

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In this paper, rice plant leaf image classification has been discussed to develop a decision support model for Indian farmers. In this context, first an architecture of the proposed decision support model has been explained. Next the required components of the proposed model are discussed. Additionally, different Machine Learning (ML) and Deep Learning (DL) techniques have been implemented and experiments have been carried out. The experiments on the Mendeley dataset have been done. Furthermore, a comparative performance study was performed to select an accurate and efficient data model. Finally, the results have been discussed and a conclusion is provided.

Keywords: Deep Learning, Image Processing, Leaf Image Classification, Machine Learning, Rice Plant Disease Detection.

Artificial Intelligence: Unlocking new Frontiers of Customer-Centric Banking

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This study examines the role of artificial intelligence (AI) in enhancing customer service, with a particular focus on personalized services and post-sales support in the banking sector. The research is centered on AU Bank's branches in Indore, India, utilizing a mixed-methods approach. A quantitative survey was conducted with approximately 90 customers, complemented by qualitative interviews with bank managers, to assess AI's impact on customer satisfaction and operational efficiency. Findings of the study indicates that AI accounts for 32.8% of the variance in overall customer experience. The introduction of AI-driven personalized customer service explains 22.9% of this variance, while AI's role in after-sales support contributes only 7%. These results align with prior predictions regarding AI's effectiveness in post-sales services. Further, AU Bank leverages AI by automating routine operational tasks, thereby enhancing service personalization. This allows customers to experience seamless interactions without frequent human intervention. However, challenges such as language barriers and the need for constant AI model updates limit its effectiveness, particularly in post-sales support. AI is poised to revolutionize customer experience in banking. However, to fully realize its potential, sustained investments in AI infrastructure, data security, and regional adaptability are essential. Future research should explore AI's long-term impact on customer loyalty and business performance, along with its adaptability across diverse cultural and linguistic contexts.

Keywords: Customer Experience, Artificial Intelligence, Personalized Customer Service.

Smart Helmet Ignition System: An Solution to Ensure Bike and Pillion Rider Safety

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The prevalence of motorcycle accidents and the dire consequences of inadequate helmet usage underscore the imperative need for innovative safety measures. This research explores the development and integration of a Smart Helmet Ignition System, aiming to revolutionize motorcycle safety through technology-driven solutions. The proposed design comprises two modules: the Helmet module and the Bike module, intricately designed to ensure rider safety by enforcing proper helmet usage before motorcycle ignition. The Helmet Unit incorporates HC- SR04 sensor, microcontrollers (ESP32), and weight sensor (load cell) functioning collectively to authenticate the presence, correct placement, and secure wear of the helmet by the rider and passenger. Conversely, the Bike unit, interconnected with the Helmet unit via Bluetooth, manages the motorcycle's ignition system. It awaits confirmation signals from the Helmet Unit, allowing the engine to start only upon verification of proper helmet usage. This paper delves into the technical intricacies of each module, detailing the functionality of individual components and their integration into a cohesive system. It explores the efficacy and reliability of sensor-based authentication, microcontroller functionalities, and the seamless interconnectivity between the Helmet and Bike Modules.

Keywords: Pillion Rider, Helmet Module, Ignition Control.

Mapping the Landscape: A Comprehension Review of Automated Cyberbullying Detection in Digital World

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Digital world provides platforms to people at large scale to share their updates, opinions publically. Various social media platforms, online messaging forums and applications are channels to spread digital hate through Cyberbullying, hate speech etc. in native languages. Cyberbullying detection is one of most crucial action to be taken for safeguarding for individuals, organizations with the intention to promote digital safety by following ethical norms. It is important to address the consequences of such actions by implementing fool proof efficient and effective measures. In order to promote digital hygiene and as solutions of this issues technology integration plays vital role. This paper covers the review of automated cyberbullying detection methods using different domains like Machine Learning(ML), Natural Language Processing (NLP), Generative Artificial Intelligent and more. Study of numerous approaches applying datasets from different social media platforms is systematically analysed. Additionally, comparative studies between identified parameters with their results are investigated. In summary issues and challenges for cyber bullying detection system are identified which will help to promote healthy digital environment and society.

Keywords: Cyberbullying, Digital World, Hate Speech, Digital Safety, Digital Hygiene, Automated Cyberbullying Detection.

Sentiment Analysis of Helpdesk Calls: Enhancing Customer Support Through Natural Language Processing

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Helpdesks occupy a strategic position in managing customer relations in today's organizations. Managing the caller primarily is very important in reducing call time to maximize customer satisfaction. The fields of Natural Language Processing (NLP) house sentiment analysis as a sub-discipline, and the insights it offers are relevant to understanding emotional tendencies during these interactions. The following paper aims to study the application of sentiment analysis for the helpdesk call analysis and more specifically the speech data. In this paper, we introduce an automatic classification system of customers' sentiments from voice-based interaction through enhanced audio analysis and NLP. Besides the conversation message, our model targets identification and analysis of emotions that may not be directly expressed in words by using complex parameters like pitch, tone and intonation. This system empowers the organizations to enhance customer services approach by providing real time information of the customer emotions regarding services hence enhancing service delivery. Therefore, this research paper assists to enhance the utilisation of SA in voice-interaction and augment customer care by capturing the clients' sentiments and emotions. These results suggest that there is a possibility of increasing customer satisfaction if only the helpdesk calls are addressed from the sentiment viewpoint.

Keywords: Sentiment Analysis, Helpdesk, NLP, Audio Mining, Customer Service, Emotion Detection, Machine Learning.

Adaptive Neuro-Fuzzy Inference Expert System for Agile-Inspired Software Development

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Precise effort prediction in Agile settings where needs often shift, is a big hurdle due to a lack of trustworthy data tools and dependence on past project know-how. Due to this, poor guesses and project failures may happen. To address this issue, we have created Agilator, an expert system to bridge the gap between real and guessed user story efforts. We have integrated machine learning models i.e., Adaptive Neuro-Fuzzy Inference System (ANFIS) and Genetic Algorithms to provide optimal predictions. We have tested Agilator on datasets containing 162 data point with important attributes like "Number of Story Points" and "Project Speed". The model achieved a training variance score of 0.99, R^2 score of 0.99, and Root Mean Squared Error (RMSE) of 2.00. In testing, we got a variance score of 0.99, R^2 score of 0.99, and RMSE of 1.93, which is better than other traditional algorithms. Our model has also used real-time adjustment and visual data profiling, which leads to optimal predictions. These outcomes show its potential as a useful and reliable tool to estimate Agile effort and manage projects.

Keywords: Agile, Expert System, Machine Learning, Software Effort Estimation, StoryPoint.

Asynchronous Architecture for Real-Time Interview Simulation: A Concurrent Processing Approach to AI-Driven Interviews

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The traditional job interview process faces scalability, availability, and consistency challenges. As a job aspirant in the volatile job market of 2024, I identified the need to create systems that make this process more efficient and consistent for all parties involved, organizations, and candidates. With interview processes varying across companies and job seekers typically submitting hundreds of applications, preparing for each unique interview becomes daunting. Additionally, companies face scalability issues with traditional interviewing processes, where a better understanding of a larger applicant pool could significantly improve their hiring efficiency. This paper presents an innovative interview bot that addresses the dual challenges of interview readiness and standardized evaluation. The system primarily serves as a practice platform for job aspirants seeking a more quantitative approach to their interview preparation. This platform could also help organizations standardize their interview evaluations by potentially offloading initial candidate screenings to autonomous bots capable of evaluating candidates' profiles for specific job roles. By leveraging generative AI technologies, a comprehensive question bank, and a WebRTC framework, this platform simulates realistic interview experiences, improving interview preparedness and evaluations. The realistic simulation is achieved through dynamic question generation, detailed feedback mechanisms, AI-generated voice for natural interaction, and concurrent system design for low-latency output generation. The system incorporates industry-standard evaluation criteria to ensure optimal performance. The body's ability to provide consistent, objective feedback while being available 24/7 addresses the limitations of traditional mock interview methods. This research contributes to the evolving landscape of AI-assisted career development tools while offering insights into scalable interview automation solutions.

Keywords: Interview Automation, Simulation, Asynchronous Architecture, Concurrent Processing.

Revolutionizing Agricultural Practices: A CNN-Driven Application for Real-Time Crop Management

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Agricultural sector is increasingly adopting artificial intelligence, deep learning, and machine learning to address critical challenges such as crop diseases and soil health. Many small-scale farmers often use inappropriate fertilizers due to limited knowledge about their side effects. This improper usage can lead to various issues, including the emergence of plant diseases, reduced soil fertility, and adverse environmental impacts. In some cases, these practices may also harm humans and animals indirectly. Addressing these challenges requires an innovative approach to provide farmers with accurate, real-time guidance on fertilizer usage and crop disease management. This paper presents an innovative mobile application designed to diagnose plant diseases and provide precise fertilizer recommendations. Using a deep learning-based (CNN), identifies diseases in major crops-potato, tomato, wheat, and rice-with high accuracy. Additionally, the app incorporates geospatial and weather data to recommend optimal fertilizers tailored to specific locations, thereby enhancing yield efficiency. The proposed system was trained and validated using publicly available agricultural datasets. Comparative analysis demonstrates that proposed model outperforms existing solutions like Plantix in diagnostic accuracy and recommendation precision. By integrating AI-driven insights with user-friendly mobile functionality, model bridges a critical gap in agricultural technology, empowering farmers with real-time, actionable advice.

Keywords: Agricultural Technology, Artificial Intelligence, Crop Disease Detection, Deep Learning.

A Framework for The Development of Computational Model of Emotions Through Facial Expression Recognition

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Emotions play a vital role in human existence as they reflect an individual's internal state. Currently, emotion recognition is extensively employed to obtain automated feedback from individuals. Among The Various Methods Available, facial expression recognition considered the most effective means of capturing human emotions. Computational Models of emotions are automated systems designed to accomplish the task of recognizing emotions and deriving meaningful insights from them. This paper compares the Various Algorithms Used for emotion recognition and presents a framework that can serve as foundation for developing a computational model of emotions providing a concise view of all its components.

Keywords: Emotion, Emotion Recognition, Facial Expression Recognition, Face Detection, Computational Model of Emotions.

Performance Analysis of Differential and Single Ended SRAM Cells in Low Power Smart System Applications

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Smart Systems, including Internet of Things (IoT) devices and biometric authentication platforms performance, depend on internal memory architecture for its high-speed, low-power operation and reliable data storage. As modern CMOS technology advances, minimizing leakage current and ensuring data retention have become critical challenges. This research investigates and compares the delay, power dissipation, and noise margin of 6T (differential mode) and 8T (single-ended) SRAM cells. While 6T SRAM remains the industry standard for general-purpose memory, 8T SRAM demonstrates superior read stability and reduced leakage, making it suitable for low-power applications. Comparative analysis reveals that the 8T SRAM offers a higher read noise margin than the 6T cell. Read delay of 8T and 6T 2.3ns and 23.4ps respectively. The write delay for the 6T cell is 481ps, compared to 1.8ns for the 7T cell. Simulations were conducted using 90nm CMOS technology across a supply voltage range of 300mV to 1 Volt. In this work, we consider two methods for calculating stability: the Butterfly Curve and the N-Curve method. This study highlights the potential of SRAM Memory designs in shaping future technologies like IoT, Artificial intelligence (AI) accelerators, and low-power smart systems by optimizing critical parameters such as power consumption, security, and silicon area.

Keywords: SRAM, Low Power Design, Internet of Things, System on-Chip, Delay, Static Noise Margin, Security.

Advanced Robotics in Plastic Film Recycling: Enhancing Automation and Efficiency in Grade C Film Densification With Gen AI

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The increasing reliance on cloud hosted AI models creates new challenges in protecting one's IP since these are irreplaceable corporate assets created through massive investments involving data, research, and expertise. This paper will present some significant strategies for protecting AI models in a cloud environment, considering technical, legal, and operational perspectives on IP protection. It detects some potential risks likely to occur in unauthorized access, reverse engineering, and data breaches; it analyzes some solutions for such issues: encryption, access controls, watermarking, and confidential computing. It also presents the legal framework of IP registration, licensing, and NDAs, which provide legal protection and the correct definition for model use. This paper, therefore, reviews some of these strategies with the aid of some case studies to put forward a comprehensive understanding of organizations regarding effective IP protection measures while deploying AI in the cloud. Based on the results, moving toward a multilayered approach incorporating technical security, legal safeguards, and robust management practices is of the essence to reduce the risks and secure valuable AI assets in an increasingly cloud dependent landscape.

Conclusions that outline recommendations to businesses and future research directions in this dynamic field are drawn in this paper.

Keywords: Plastic Film Recycling, Grade C Film, Robotics, Generative AI, Automation, Densification, Contamination Reduction, Sensor Integration, Predictive Maintenance, Circular Economy, Sustainable Waste Management.

Deep Neural Network Paradigms for Improved Brain Tumor Diagnosis in Magnetic Resonance Imaging

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This paper aims to discuss the roles of accurate and efficient diagnosis of brain tumors in enhancing patient diagnostic results and treatment plans. MRI plays a significant role in the diagnosis of brain tumors because of high resolution imaging of the brain region. However manual evaluation of MRI scans is very time consuming and lacks reproducibility. Advanced architectures have come up as revolutionary solutions that involve deep neural network paradigms that improve the diagnosis of tumors. Establishing the foundation of deep learning methods applied to segment, classify, or detect brain tumors, this paper covers several approaches like CNNs, transformer based learning, hybrid and generative. Certain tasks include spatial complexity, data deficiency, and noisy imaging conditions that U-Net, Vision Transformers, and GANs solve, providing high accuracy and efficiency. Furthermore, techniques, such as self-supervised and transfer learning enhance model generalization, even with limited amounts of data. This paper builds upon the last decade of developments in the deep neural network paradigms and demonstrates how they might transform brain tumor diagnosis. These results suggest that further work should be done to build accurate, explainable, and clinically augmented models to make substantial contributions to realize precise medicine and medical imaging.

Keywords: Medical Imaging, Convolutional Neural Networks (CNNs), Transformer-Based Models, Vision Transformers (ViTs), Hybrid Architectures, Generative Adversarial Networks (GANs), U-Net.

Review of Fault Detection Based on Determining Software Inter-Dependency Patterns for Integration Testing Using Machine Learning on Logs Data

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This study reviews a machine learning model applied to log files that creates entity and relationship patterns to be used in fault detection. Fault detection is an important part of integration testing because software project development is ongoing, and it could be integrated into a continuous testing approach. As the project grows, new features and code are added, and the code becomes more complex. The use of test logs enables the detection of patterns before they become deeply embedded in the code, which might make them difficult to comprehend and understand relationships and entity components. The model presented in this work is helpful in identifying which parts of the code are frequently changed, providing useful information for test case creation. Additionally, the entity relationship models are automatically created, and they may provide relevant patterns to create new tests to avoid or identify new faults in established relationships if they have never been tested.

Keywords: Fault Detection, Software Testing, Inter-Dependency Patterns, Integration Testing, Logs Data.

IoT Integrated Smart Donation Box

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The Donation Box is an idea where an automated safe donation system has been developed using Internet of Things (IoT). IoT refers to devices connected over the internet that enable them to collect and share data. On this system, the user can donate food, grocery, or money using an Liquid Crystal Display (LCD) with three buttons. Once the user selects the donor type and inputting their contact number, then the donor places the item on a plate. Then, after placing the item, the system automatically sends a message both to the donor and to the organization containing confirmation about the donation type and the phone number. This way, the organization is able to monitor all the donations it receives in real time. The system is equipped with security and monitoring attributes through IoT sensors. It also provides protection against any form of theft. If an unknown person tries to withdraw something from the donation box, then an alert notification message is automatically sent to the organization. Thus, the objects placed inside are nicely protected. Since IoT technology is used, it would result in immediate monitoring and communication. In this way, it makes the donation process smooth and secure for both the donors and the organization. It streamlines the donation process while strengthening simultaneously the transparency and security factor involved in charitable donations.

Keywords: Smart Donation Box, Internet of Things, Real Time Communication, Security Alerts, Donation Tracking.



Optimizing Timetable Generation for Educational Institute Using Genetic Algorithm

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The timetable generation process is a critical component of educational institutions, characterized by its inherent complexity and NP-hard nature due to a multitude of constraints. This paper provides a comprehensive comparative analysis of various methods employed in timetable generation, with a particular focus on Genetic Algorithms (GAs). GAs offer a promising approach to solving combinatorial optimization problems efficiently, which makes them well suited for addressing the challenges of timetable scheduling. We evaluate the performance of GA based methods in comparison with heuristic algorithms, examining key factors such as solution quality, computational efficiency, and scalability. By doing so, we aim to provide valuable insights into the effectiveness and suitability of GA based strategies for timetable generation systems. This study highlights the strengths and limitations of GAs in handling the intricacies of scheduling tasks, contributing to a deeper understanding of their potential in overcoming the challenges inherent in timetable generation. The findings offer significant implications for future research and practical applications in this domain.

Keywords: Hereditary Calculation, Dynamic Principles, Rule Based Specialists, Asset Planning, Heuristic Calculations, Genetic Algorithms.

Transforming Agriculture: Plant Disease Detection With Transfer Learning and Deep Neural Network

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Plant leaf disease detection plays a critical role in ensuring healthy crop yields and preventing severe damage caused by plant diseases. Traditional diagnostic methods, however, are often time-consuming and complex, requiring laboratory practices. In contrast, Artificial Intelligence (AI), particularly Deep Learning (DL) and Machine Learning (ML) techniques, have emerged as a boon to the agricultural industry. Recently, ML and DL approaches have been increasingly applied for diagnosing plant diseases. For this study, the Plant Village dataset was obtained from Kaggle and augmented to enhance model training. The proposed method improves detection accuracy without requiring extensive labeled data by leveraging pre-trained deep learning models for feature extraction from plant leaf images. This methodology encompasses data collection, pre-processing, model selection, and evaluation. The performance of the model was assessed using accuracy, precision, recall, and F1 score metrics. The results demonstrated that transfer learning significantly enhanced the model's ability to classify both healthy and damaged leaves with high accuracy and a low probability of false positives. Additionally, the model's adaptability was tested by evaluating its generalization ability across different plant species and types of infections. This paper presents a Convolutional Neural Network (CNN) augmented with pre-trained models to identify and categorize plant leaf diseases. On the Plant Village dataset, the proposed approach achieved a training accuracy of 99.81% and a validation accuracy of 99.68%.

Keywords: Plant Disease Detection, Transfer Learning, Deep Learning, Convolutional Neural Network (CNN), Agriculture Technology.

A Secure Device Identity Mechanism for IoT-Enabled Smart Buildings Using RFID and ESP32

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The Internet of Things(IOT), provides efficient and affordable solutions to everyday problems, improving human life quality. In addition, having a safe and secure environment is life-sustaining for all. The concept of a 'smart home' has grown in popularity in recent years. A smart home is a set of issues like intelligent decision-making, secure identification and authentication of IOT devices, and constant communication. Currently, we investigate a scalable and secure device identity management system in IoT-enabled smart buildings. In this work, we propose an Radio Frequency Identification (RFID), micro controller (ESP32) based system that addresses the specific needs of a smart building scenario, characterized by the fast growth of connected devices that demand efficient real-time protection against multiple threats.

Keywords: Smart Building, ESP32, RFID, Sensors, Google Sheets.

ClarifIt- Web Based Messaging Application for Enhanced Communication With Clarity

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In the modern era of communication, different people with different temperaments are using chat applications for chatting. In today's digital age, chat applications must address issues such as misunderstandings, distractions, the receiver's mood/feeling, voice-to-text conversion, graceful conversation termination, quick shortcut message forwarding, and profile management tasks. This work proposes a web-based chat application such as clarifIt to solve these problems. ClarifIt is a web-based messaging application that improves communication performance and readability by integrating advanced capabilities. ClarifIt is equipped with mood toners to track the mood and the receiver's feelings about your communication. Acceptance of toners and color coding systems helps to avoid misunderstandings and distractions with sender and receiver identity. In some cases, where users are unable to type messages with language skills, clarifIt is adapted with voice to text messaging feature to convert voice to text. Every time communication needs to end respectfully, clarifIt has a graceful conversation termination module to gracefully close chats. ClarifIt adds a profile maintenance feature to maintain up-to-date profiles. Video and audio-sharing features of clarifIt facilitate multimedia communication. Further, the User Interface (UI) of clarifIt is built using React with Redux Toolkit. Socket.io is utilized to provide message transmission. MongoDB and Cloudinary are used for data storage.

Keywords: ClarifIt, Web-Based Messaging Application, Mood Toners, Voice to Text, Graceful Conversation Termination.

A Survey of Attack Prediction Approaches in Cyber Security

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In the age of digitization, cyber-attacks significantly affect the world. Lots of resources and the economy are compromised due to cyberattacks. Predictions of Cyber Attacks Enable Us to handle the attack at the appropriate time, which can save money and resources. This paper surveys the different methodologies used to predict cyberattacks. These methodologies are broadly classified into discrete and continuous models. Discrete model examples are the attack graph, Bayesian network, and Markov model, while time series are examples of a continuous model. Other methodologies used to classify and predict the attacks are machine learning, data mining, and deep learning.

Keywords: Cyber Security, Cyber-Attack, Prediction, Distributed Denial of Service (DDOS).

A Survey on Change Detection in Synthetic Aperture Radar Satellite Images

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Change detecting in Synthetic Aperture Radar (SAR) satellite images has garnered significant attention for its applications in urban planning, disaster management, and environmental monitoring. SAR's ability to operate under all weather and lighting conditions makes it indispensable for monitoring dynamic changes on Earth's surface. However, distinguishing man-made changes from natural variations, such as vegetation growth or seasonal water fluctuations, remains a critical challenge. This survey explores recent advancements and methodologies in change detection for multi-temporal SAR images, focusing on hybrid approaches that integrate traditional techniques and deep learning. Key methods, including Change Vector Analysis (CVA), Principal Component Analysis (PCA), and Fuzzy C-Means (FCM), are discussed alongside emerging techniques like self-supervised learning and contrastive loss functions designed to minimize false positives. We review experimental results from the Sentinel-1 dataset, highlighting trends, strengths and limitations of existing approaches. Outputs Standard formats such as GeoJSON or shape files demonstrate their utility for GIS-based real-time monitoring systems. By providing a comprehensive overview, this paper aims to inform future research and development of scalable, accurate solutions for change detection in SAR remote sensing applications.

Keywords: SAR, Change Detection, Sentinel-1, PCA, FCM Clustering, GIS Applications, CVA, CACo.

A Review of Different Approaches to Detect Online Cyberbullying and Hate Speech

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With the rapid rise in social media usage, platforms such as X(Twitter), Instagram and Facebook have become prevalent spaces for online interaction. These platforms allow users to share different forms of media such as text, image, video, etc. However, these platforms have also become a hotspot for harmful activities such as cyberbullying and hate speech. While these platforms employ solutions like machine learning models for text-based detection and deep learning, their ability to handle multi-modal content like images and videos remains limited. Our proposed solution introduces a web-based application that integrates multi-modal data analysis across the four major platforms: X(Twitter), Instagram and Facebook.

Keywords: Cyberbullying, InceptionV3, Support Vector Machine, Convolutional Neural Network.

Role of Chi-Square in Enhancing the Accuracy of Classifiers in Emotion Recognition

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Emotion recognition has been a fast-emerging field in artificial intelligence. It has applications in the healthcare sector, human-computer interaction, and behavioral studies. Feature selection is vital in improving the accuracy and efficiency of classifiers in this field, especially for high-dimensional data. This paper investigates the utilization of the chi-square test for improving the performance of the various classifiers for emotion recognition. The experiment uses the benchmarking CK+ (Cohn-Kanade) database that contains labeled facial expression images. The chi-square test is used to select features in the most relevant manner corresponding to Action Units (AU), related to emotions, targeting here "sadness". Reduced dimensionality of the dataset gives rise to the chi-square test while removing irrelevant features and alleviating noise and computational complexity associated with it. Accuracy obtained from the K-Nearest Neighbour (k-NN) classifier is compared before as well as after applying chi-square feature selection. The preliminary results show high improvement in the classification accuracy score, 79% becoming 87%, which indicates high effectiveness in refining the features by the application of chi-square. Thus, this experiment shows how statistical feature selection techniques have relevance in optimizing various machine learning classifiers for accurate emotion recognition. After observing the improvement in the performance of KNN, the performance of classifiers like Random Forest (RF), Support Vector Machine (SVM), Logistic Regression (LR) and Naïve Bayes (NB) was also checked. Improvement in F1-score for each classifier was recorded after applying a chi-square statistical tool on the relevant extracted features from the images. The possible combination of the chi-square attribute with classifiers can really lead to robust and highly efficient systems in emotion recognition technology, leading to more high-end applications of AI-powered systems.

Keywords: Emotion Recognition, Action Units, Chi-Square, K-Nearest Neighbour, Random Forest, Support Vector Machine, Logistic Regression, Naïve Bayes.

Comparative Performance Evaluation of TensorFlow and PyTorch for Handwritten Digit and Image Classification Using MNIST, EMNIST and CIFAR-10 Datasets

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In this paper we provide results of performance comparison of handwritten digit recognition and complex image classification. We used TensorFlow and PyTorch digital libraries to obtain results. The datasets used were CIFAR-10, MNIST, and EMNIST. The parameters like training time, detection time, resource usage, accuracy, and model size were considered. A standard neural network was trained using a training dataset and results were validated using a validation dataset. The experimental results show varying efficiency, utilization, and model performance.

Keywords: Handwritten Digit Recognition, Image Classification, Training Time, Detection Time, Resource Utilization, Model Size, PyTorch, TensorFlow.

Smart Monitoring and Prediction of Industrial Pollution Using IoT and ANN

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The environment suffers greatly from industrial pollution, which emits harmful gases such as sulfur dioxide and carbon monoxide. These emissions lead to the formation of smog, acid rain, and global warming, besides adversely affecting the respiratory system. In comparison, the high concentration of carbon dioxide and other greenhouse gas emissions leads to rising temperatures due to ice caps melting and extreme and violent storms and drought which directly threaten terrestrial life. Its pollution also contaminates drinking water with toxic substances besides industrial machinery noise disrupting normal ecosystems. Chemical spills have also been known to raise environmental damage besides land deterioration that affects biodiversity and results in long-term ecological destabilization. This paper offers a solution for integrating Machine Learning and Internet of Things (IoT) technologies into the MATLAB platform to mitigate pollution monitoring and management. IoT-based technologies make it possible to monitor levels of pollutants in real-time, and comparison with established thresholds sends an alert in case limits are exceeded. Predictive algorithms of machine learning classify the diverse field parameters, identify trends, and forecast future events that may arise due to pollution. This approach will ensure timely prevention, maintaining pollution levels within acceptable limits. The system is intended to reduce overall pollution, safeguard biodiversity and public health, and promote long-term environmental sustainability.

Keywords: Internet of Things, Machine Learning, Embedded System, Artificial Neural Network.

Comprehensive Assessment of Existing Copy Move Forgery Detection Discussing the Trends and Challenges

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Because of the impactful picture editing instruments, images are available to a few controls; in this manner, their genuineness is becoming problematic particularly when pictures have compelling power, for instance, in an official courtroom, news articles, as well as protection rights. Image forensic approaches decide the trustworthiness of pictures by applying different super advanced mechanisms created in the previous work. In this article the pictures are broke down for a specific sort of imitation where a locale of a picture is reordered onto a similar picture to make a copying or to hide a few prevailing items. To recognize the Copy- Move Forgery (CMF) attack, pictures are primary categorized into overlapping square blocks as well as DCT constituents are implemented as the block representations. Because of the great layered feature of the element space, Gaussian RBF kernel PCA is functional to accomplish the condensed dimensional feature vector depiction that likewise superior the proficiency at the time of the feature matching. Investigational trials are conducted to assess the suggested strategy in contrast with cutting edge. Thus, this paper offers the several proposed procedures that give a computationally effective and dependable method of Copy-Move Forgery Detection (CMFD) that builds the believability of pictures in proof centered applications.

Keywords: Forgery, Deep Learning, RESNET50, VGG, Feature Extraction, Transfer Learning.

Personalized Destination Forecasting and Recommendation: A Multi-Phase AI-Driven Approach for the Tourism Industry

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Destination Forecasting and Recommendation encompasses the projection of user-favored travel locales predicated on historical data, individual preferences, and prevailing trends, succeeded by the provision of customized recommendations aimed at optimizing travel arrangements. While current methodologies are hindered by issues related to scalability, computational inefficiency and a paucity of personalization, they concurrently exhibit deficiencies in reducing inaccuracies such as false positives and false negatives, thereby compromising the reliability of recommendations. To address these challenges, this research introduces a multi-phase AI-driven framework for personalized destination forecasting and recommendation specifically within the tourism sector. The proposed framework initiates with sophisticated data pre-processing methodologies, which include tokenization, stemming, stop word elimination, and TF-IDF, to enhance the quality of the data. Feature extraction is executed via Part-of-Speech (POS) tagging, while the predictive modeling phase amalgamates the computational efficiency of Squeeze Net with the superior feature extraction capabilities of VGG Net through the innovative hybrid architecture known as VGGFire Net. Recommendations are formulated utilizing collaborative filtering techniques alongside Jaccard similarity to accurately discern user preferences. The proposed model achieved outstanding results on Dataset, with 70% training and 30% testing split, the model t98.55%accuracy,96.88%precision,97.78% sensitivity, and 98.44%specificity. For Dataset, with an 80% training and 20% testing split, the model also demonstrated low FPR: 0.0821, FNR: 0.0810. Implemented in Python, this methodology proved its reliability, scalability, and potential to revolutionize personalized travel experiences in the dynamic tourism industry.

Keywords: Destination Forecasting, Recommendation System, Tourism, VGGNet, SqueezeNet.

Shape and Margin Dynamics in Analog Computing: A Machine Learning Perspective

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This study examines design of Shape-Based Analog Computing (S-AC) circuits using a margin-propagation-based analog computing circuit. The Scaling of the circuit with digital designs S-AC designs are precision, speed, and power. For the implementation of the S-AC circuits mathematical functions are used with machine learning architectures. For circuit simulations input/output characteristics are mapped from a CMOS process. Accuracy of S-AC based neural network is a robust to use when changes temperature with the parameters. The basic S-AC remains scalable process when the increase in the number of splines, increases the accuracy. This paper also focuses on the Design Margin and Shape Analysis. The design parameter S and machine learning applications both benefit from this form. The system may precisely replicate the desired functional form. Instead of using traditional design methods, S-AC design lets the user select the proto-shape based on the application's requirements and concentrate on obtaining the appropriate functional forms.

Keywords: Process Scalability, Margin Propagation, Machine Learning, S-AC Computing.

Disruptive Trends in Automobile Industry Using IoT: Management and Sustainability Challenges

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Disruptive technologies are transforming automobile industrial sector in several ways, including Electric Vehicles (EVs) which are more sustainable alternative to traditional combustion engine cars, and thus reducing windling fuel reserves and increased air pollution. This is making human life expectancy better and higher. A change in lifestyle and availability of resources making the technology more pervasive at some dear cost too! Further, with the development of autonomous driving technology paralleled with EVs, these two technologies are transforming the automobile industry. Moreover, with the advent of shrinking hardware size, the communicating devices–IoT, is allowing for vehicle connectivity and ease of driving and pleasant experience. AI is helping these industries to produce efficient solutions, such as design of seat brackets that are 40% lighter and 20% stronger than traditional brackets. This has made a prowess using other disruptive innovation technologies including energy and power technology and intelligent control technology. The article delves deeper into the disruptiveness happening in automation where IoT based systems are revolutionizing the automobile sector with comforts and ease of driving hassles. On the other hand, when it comes to autonomous vehicles, cases of abrupt accidents were reported and the governing laws are inadequate to deal with – especially when human life is at stake! Such challenges are becoming more imperative and a perspective view is being presented where these issues are addressed. A holistic view is presented where sustainability and challenges are underway for automation with disruptive technology diverse mobility autonomous driven trends are the trends.

Keywords: Autonomous Cars, Disruptive Innovation, IoT, Connected Devices.

Enhancing Weather Forecasting With Machine Learning and Deep Learning: A Comparative Study of Predictive Models

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Weather prediction plays a central role in the welfare of the society and daily economic activities. Accurate conventional NWP methods are currently widely employed but are associated with constraint in managing the non-linearity of the ambience. This paper focuses on realising the potential of supervised Machine Learning (ML), and Deep Learning (DL) to improve weather forecasting. A comparison of several selected models of ML and DL is made based on several factors, including accuracy of prediction, model stability, and computational complexity. The approach is validated in the context of a real scenario, showcasing on how deep learning models can outperform traditional methods achieving higher accuracy and better coping with atmospheric conditions, especially when hybrid models are employed.

Keywords: Weather Forecasting, Machine Learning, Deep Learning, Predictive Models, Atmospheric Data.

A Blockchain Framework With Smart Contract Mechanism

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The study's overarching goal is to learn about the state of blockchain applications as they are now and to assess whether or not they are meeting the rising need for blockchain expertise in the applications sector. In addition, it analysed the relative merits of Ethereum and Hyperledger to decide which would be the better answer in each scenario. By drawing on a large pool of data, the study was able to provide invaluable insights on the complex nature of a blockchain application. Journals, periodicals and reports were some of the materials used. The term "smart contract" is used to describe a digital transaction that executes itself, records the relevant dynamic activity on a distributed ledger, and proves its validity via predetermined conditions. A smart contracts the central feature of a blockchain that allows to be utilised as a platform for use cases outside of the domain of currency. Education, voting, real estate, entertainment, the Internet of Things (IoT), supply chain management, healthcare, and a great many more may all benefit from its implementation. Significant progress has been made in recent years to develop blockchain technology, with a focus on smart contracts; yet, there is a lack of study into the concept of smart contracts. Despite the numerous benefits of smart contracts, their mainstream adoption has been slowed by a variety of challenges, including security flaws, lack of coverage, and difficulty in enforcing contracts legally.

Keyword: Blockchain, Smart Contract, Solidity, Legal Issues, Ethereum, Hyperledger.

Voltage Sag Reduction in a Grid Tied Solar Photovoltaic Plant by Fractional Order Based STATCOM

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An abrupt drop in the electrical system's voltage, known as voltage sag, can be caused by a number of factors, including overloading, line outages, load changes, and system faults. Power system voltage sag can affect the sensitive equipment, cause downtime in specific industries, etc. The 400V supply frequency 50 Hz utility grid connected to the 1KW Solar Photovoltaic plant system integrated Genetic Algorithm (GA) optimized fractional order based STATCOM regulating PWM-VSI has been simulated using MATLAB in the suggested system. Double line to ground (LLG) fault in the 400 V system has been shown to be the cause of voltage sag. The problem has been resolved through the integration of the 400 V system's SPV plant and GA optimized fractional order STATCOM-tied utility grid.

Keywords: Reactive Power Control, Static Synchronous Compensator, Voltage Sag, Double Line to Ground Fault, Solar Photo Voltage Plant, Micro Grid, Utility Grid.

Art Generation of Konkani Music Using AI

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Art and music, two dateless forms of expression, have been deeply intertwined in mortal culture. Our design seeks to combine these two art forms using Generative Adversarial Networks (GANs) and Natural Language Processing (NLP) to produce artwork that visually encapsulates the overall sense and meaning of Konkani conversational music. While results like Artificial Intelligence Virtual Artist (AIVA) or models that induce art from music or textbook give innovative approaches, none focus specifically on indigenous languages like Konkani to induce culturally applicable art. The design addresses the lack of real- world operations in AI by creating an accessible platform to show Konkani poetry and music, therefore contributing to the preservation and recognition of the language. Likewise, being AI models frequently fail to interpret artistic and emotional surrounds, which are vital for generating meaningful labors in low-resource languages. To overcome this, we incorporate sentiment analysis and thematic birth to enhance the environment- mindfulness of our models, ensuring that the generated art aligns with the emotional tone and artistic nuances of the music. The design unfolds in two stages. The first stage involves rephrasing the lyrics of a song into English, while the alternate stage focuses on framing the restated lyrics into meaningful rulings, assaying their sentiment, and generating the corresponding artwork. By spotlighting Konkani conversational music, we aim to give a platform for its recognition in a distinctive and engaging manner, fostering artistic heritage through technology.

Keywords: Generative Adversarial Network (GAN), Natural Language Processing (NLP), Convolutional Neural Networks (CNN), Large Language Models (LLM), Recurrent Neural Networks(RNN).

Smart Agriculture 4.0: Precision Crop Disease Identification and Classification Using Advanced AI Techniques

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Smart Agriculture 4.0 is focused on accuracy in crop disease diagnosis and classification through the use of the latest advances to revolutionize the way farming is done. This study thus presents a robust framework that makes use of AI tools to enhance agricultural output and minimize losses. This method incorporates state-of-the-art image processing for preprocessing and data gathering, using K-means clustering for efficient segmentation and Contrast-Limited Adaptive Histogram Equalization(CLAHE) for picture improvement. For Feature Extraction, the improved AlexNet architecture is utilized, while a model that combines Efficient Net and LSTM for better accuracy and reliability is used for classification. This uses the Python platform for implementation, and measures such as accuracy, recall, precision, and others are used for assessment. For a complete evaluation, finally, the proposed approach is contrasted with current methodologies. By looking to improve agricultural production and sustainability by intelligent, real-time diagnostics this chapter investigates advanced artificial intelligence algorithms for accurate crop disease diagnosis in 4.0 smart Agriculture. Experimental results for achieving the highest specificity, achieved with 70 percent on the learning rate with proposed the method is 0.9919, the high specificity with 80 percent on the learning rate with 0.9944.

Keywords: Smart Agriculture, Precision Agriculture, Crop Disease Identification, Artificial Intelligence, K-Means Clustering Improved AlexNet.

Brain Tumor Detection Magnetic Resonance Images Using Genetic Algorithms With Multiple Stages

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Biomedicine is still attempting to overcome one of the profession's most pressing problems: detecting brain tumors. Early Detection of Brain Cancer Possible with advanced technology or instruments. Classifying brain cancer types utilizing patent brain images allows for automation in automated operations. Furthermore, the proposed new method is used to distinguish between brain tumors and other brain illnesses. To distinguish the cancer from the other parts of the brain, the input image is first pre-processed. Following that, the images are separated into different hues and levels before being processed using the Grey Level Co- Occurrence and SURF extraction methods to reveal crucial information in the photos. Genetic optimization reduces the size of the retrieved attributes. An advanced learning technique is utilized to train and validate tumor categorization based on cut-down characteristics. The technique's accuracy, error, sensitivity, and specificity are all compared to the present method. The approach has a 90%+ accuracy rate, with less than 2% inaccuracy for all types of cancer. Finally, the specificity and sensitivity are greater than 89% and 49%, respectively. Genetic algorithms are more efficient because the methods used are more accurate and specialized than the other ways.

Keywords: Genetic Optimization, MRI, GLCM, Brain Tumor, SURF, Advanced Machine Learning.

Machine Learning Framework for Intelligent Hand Gesture Recognition: An Application to Indian Sign Language and Hand Talk

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Communicating with individuals with hearing disabilities poses significant challenges. The research presented in this paper represents an effort to further explore the complexities associated with character classification in Indian Sign Language (ISL). It's important to note that sign language alone may not suffice for effective communication, especially for individuals with hearing or speech impairments. The gestures made by individuals with disabilities can appear jumbled or confusing to those who are unfamiliar with the language. Sign language recognition has long been recognized as a crucial tool to aid individuals with hearing impairments. Over the years, researchers have dedicated significant efforts to advancing this field of study. Recently, there has been a growing focus on developing solutions that can be universally applied in India, where the need for such technology is particularly pronounced. The primary objective of this paper is to develop an accurate and reliable sign language recognition system. By Critically Evaluating Different Methodologies, the aim is to identify the most effective method for accurately recognizing and interpreting sign language gestures, ultimately contributing to the advancement of assistive technologies for the deaf community.

Keywords: Indian Sign Language, Dataset, Media Pipe, Classification, Neural Network, KNN, SVM, Random Forest.

Sustainable Fire Detection in Smart Cities Using ResNet101V2 and Optimized Gradient-Boosting Method

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Fire detection is a critical component in ensuring the safety of smart cities, where timely and accurate identification of fire incidents can prevent widespread damage. In this context, this work provides a sustainable and updated fire detection system for smart cities utilizing ResNet101V2 for feature extraction and Gradient Boosting enhanced using the Sea-Horse Optimization (Sea HO) method. With a precision of 0.96 and a recall of 0.95, it attained a better accuracy of 95% than often used models such as CatBoost, XGBoost, and SVM. Hyperparameter tuning was greatly aided by SeaHO, thereby improving the performance and resilience of the model. With minimum false alarms and great fire detection accuracy, the suggested method is perfect for real-time fire detection and guarantees safety in metropolitan surroundings.

Keywords: Fire Detection, Sustainability, Smart Cities, ResNet101V2, Gradient Boosting, Sea-Horse Optimization.

Machine Prudence and Human Imprudence – Balancing Thought and Action on Artificial Intelligence

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Humans seem to revel in the replacement of natural and divine intelligence by modern artificial intelligence. Inventions would be inimical if their weird consequences are not controlled or taken care of. Science and technology is expanding the etymology of innovations faster than the end-products of scientific explorations and inventions – for what – to corroborate or confabulate or corrode or confuse human need or greed. On the one hand, AI offers a tantalizing glimpse into a future where justice is delivered more efficiently and objectively. AI algorithms can sift through mountains of data, identify legal precedents, and predict case outcomes with unprecedented speed and accuracy. This could help reduce court backlogs, minimize human bias in decision-making, and improve access to justice for all. However, the path towards AI-assisted justice is fraught with challenges. Additionally, the potential for AI to automate legal tasks or even replace human judges entirely raises profound ethical and philosophical questions about the nature of justice itself. This article explores these issues through various lenses, examining the potential applications of AI in different aspects of the justice system, from legal research and evidence analysis to sentencing recommendations and risk assessments.

Keywords: AI, Judicial System, Administration of Justice, Human Intelligence.

Transforming Agriculture With IoT: A Framework for Precision and Efficiency

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The integration of Internet of Things (IoT) technologies has opened new avenues for enhancing agricultural productivity by allowing real-time monitoring, fact-based decision-making, and automation. Nevertheless, most of the existing IoT-based systems rely on expensive hardware and advanced technologies, making them clearly impractical for small and medium-scale farmers. Such systems also have problems such as inconsistent power distribution, unstable local communication networks, and limited net infrastructure in rural areas. This work proposes a powerful and scalable IoT framework to tackle these limitations, especially for Indian agriculture. This framework integrates low-power sensors, long-range wireless communication using LoRa, and robust statistics processing through cloud computing. Moreover, this particular gadget embodies ML and AI techniques for predictive analysis. The prediction detection of crop diseases utilizes the ESP32-CAM module. It is developed with an objective of practical implementation, where it will revolutionize agriculture by improving resource utilization and serving stakeholders such as farmers, agricultural scientists, and companies towards optimizing agricultural production.

Keywords: Internet of Things, Sensors, ESP32, Long Range, Artificial Intelligence, Machine Learning, Deep Learning, Crop Diseases.

Comparative Analysis of Deep Learning and Machine Learning Techniques for Obesity Classification

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The number of obese individuals has risen to alarming levels throughout the world and today obesity can be considered an illness that causes numerous diseases such as diabetes, cancer and heart disease. Effective Obesity classification can help in early detection of the disease and better planning of preventive measures for the life style diseases. The study aims to compare Machine Learning (ML) techniques: Logistic Regression, Decision Tree, Random Forest, XGBoost and Support Vector Machine (SVM) with Deep Learning models: Recurrent neural network (RNN) and Neural network for obesity classification using anthropometric data and lifestyle. The dataset which is used here has features of age, gender, weight, height, body mass index (BMI) and physical activity level. Pre-processed the data (scaling, missing value treatment), to deal with them before model training. We determine the performance of each model through accuracy, precision, recall and F1- score with respect to three obesity categories: normal weight, overweight, and obese. Although models like Decision Tree, Random Forest and XGBoost reached an accuracy of 1.0000 which indicates they are overfitting to the data at hand hence their poor generalization capability. Deep learning models, especially the RNN (which captures long-term non-linear dependencies in time), generally outperformed traditional machine-learning techniques thanks to their ability to make more general conclusions without overfitting. The current research unveils the promise in those techniques, with future work required to mitigate overfitting and mixed hybrid models for additional reliability during practical healthcare deployments.

Keywords: Machine Learning, Obesity Classification, Decision Tree, Deep Learning, Logistic Regression, Support Vector Machine (SVM), Random Forest, XGBoost, Recurrent Neural Network (RNN), Neural Network, Overfitting.

Hydrodynamic Anomaly Detection Framework for Real-Time Identification of Pipe Leakage Events Using Advanced Flow Sensing Technology and Machine Learning Approach

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The rapid increase in water usage and infrastructure development has led to a significant demand for efficient water management systems. This paper presents a pipe leakage detection system that employs two advanced flow sensors for accurate, real-time leak detection. The system is designed to minimize water wastage, reduce maintenance costs, and prevent property damage. By integrating flow sensors with a monitoring system, the solution enhances leak detection precision and facilitates prompt repairs. The proposed system ensures cost-effectiveness, user-friendliness, and sustainability, making it a viable option for domestic and industrial applications. The work also demonstrates the effective use of Isolation Forest ML technique for detecting flow rate anomalies, indicative of leaks. By classifying these anomalies into severity levels for proactive leak management.

Keywords: Pipe Leakage Detection, Flow Sensors, Real-Time Monitoring, Water Management, Machine Learning(ML), Isolation Forest.

Hybrid Approach to Recommender System Model

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Recommender systems are a popular research area broadly applied from e-commerce to e-learning systems. The paper presents a hybrid approach to recommender systems that leverages user reviews, clustering, and sentiment analysis to enhance recommendation accuracy. Traditional models primarily rely on user ratings, often neglecting the rich contextual information in textual reviews. The proposed method extracts user preferences by analyzing review content through sentiment analysis and clustering techniques, providing a more nuanced understanding of user tastes and preferences. By incorporating this detailed preference data and contextual information, the system generates Top-N recommendations that are relevant to the user and personalized. We applied our model to the Yelp dataset, which includes diverse and extensive user reviews of various businesses. Comparative evaluations demonstrate that our approach significantly outperforms traditional models based solely on user ratings, achieving higher accuracy in recommendation predictions. The results underscore the importance of utilizing multidimensional data sources in recommendation systems, highlighting the potential for improved user satisfaction and engagement. This study contributes to recommender systems by showcasing the benefits of a comprehensive analysis of user-generated content and its impact on recommendation quality.

Keywords: Recommender Systems, Hybrid Recommender System, Collaborative Filtering.

IT Act Provisions for Text-Based Cybercrime Complaints: Classification and Legal Evaluation of Cybercrime Incident

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Cybercrimes especially those involving child abuse, data breaches, and privacy violations are increasing in frequency due to the quick development of technology, which emphasizes the necessity of complex systems to categorize and deal with these offenses. There are many opportunities to analyze cybercrime data using Machine Learning (ML) techniques because of its enormous accumulation. In this research, we propose a model that automatically proposes pertinent portions of cyber legislation based on the features of reported cybercrimes using Random Forest and Gradient Boosting algorithms. Our model employs a Bag of Words (BoW) approach for feature engineering to evaluate case descriptions and suggest relevant legal sections, such as Section 66E for privacy protection, Section 43A for data breach reporting, and Section 72A for breach disclosure, using Natural Language Processing (NLP) for feature extraction and classification. This strategy minimizes false positives while ensuring equitable law enforcement by precisely categorizing violations. By automating law proposals and simplifying legal answers to various cybercrimes, especially those concerning privacy and data protection, the model improves the capabilities of cybercrime units and achieves high accuracy and precision in anticipating pertinent legal sections.

Keywords: Cybercrime, Machine Learning, NLP, Cyber Law, IT Act, Data Breach.

Comprehensive Study of Persistence Techniques in In-Memory Databases

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In recent years, NoSQL databases have become essential for delivering Big data web services. As memory capacities increase, there is a heightened focus on In-memory NoSQL (IM-NoSQL) systems, which use Dynamic Random-Access Memory (DRAM) to enable minimal latency. However, because DRAM is volatile, IM-NoSQL systems need effective persistence and recovery methods to prevent data loss during server failures. This paper presents a detailed study of the performance of persistence and recovery techniques in IM-NoSQL databases. The evaluation examines the performance of Snapshotting and logging techniques, focusing on their effectiveness in failure recovery. Our research aims to answer critical questions: (i) This study investigates whether IM-NoSQL systems maintain efficiency under memory constraints. (ii) What are the performance trade-offs between using snapshots and logging? (iii) How quickly can an IM-NoSQL system recover after a failure? (iv) How does the choice of persistence method affect the system's performance? This study utilizes Redis as a representative IM-NoSQL system to evaluate persistence strategies, recovery durations, and system performance metrics.

Keywords: In-memory Databases, IM-NoSQL, Persistence Techniques, Redis, NoSQL, Snapshotting, Logging, Append-Only File (AOF), Key-Value Stores, RAM Cloud, Memcached, Apache Ignite, Hybrid Persistence Models, Crash Recovery, Database Benchmarking, Cloud-Native Databases, Workload Optimization.

Enhancing Online Examination Systems Through Synonym-Based Answer Matching

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The Question Answering (QA) system provides relevant answers or information to user queries. In the online examination system, the system checks the answers with the model answers and generates the result. The system rejects responses based on synonyms and instead verifies the result based on keyword matching. In this article, we concentrated on the topic and used Jaccard Similarity to compare the student response with the model response. The similarity is determined by how closely the student's response matches with the model response. If student responses do not match with the model responses, they should match those in the synonym dictionary. The result generates good results when student answers match with model answers and synonyms dictionary than student answers only match with model answers.

Keywords: Online Examination System, Question Answering (QA), Synonym Based Matching.

Glaucoma Detection Using Visual Geometry Group 22 Model

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Glaucoma is a degenerative eye illness that, if left untreated, may result in permanent vision loss and blindness. If you have glaucoma, see your eye doctor often. Because early identification and treatment are essential in maintaining one's eyesight, research into more accurate and effective detection methods for glaucoma is an essential subject. Using photographs of the retinal fundus, machine learning algorithms have shown significant promise as a possible assist in diagnosing glaucoma. In this work, we investigated the ability of five different machine learning algorithms to identify glaucoma from pictures of the retinal fundus: AdaBoost, K-Nearest Neighbor (KNN), Support Vector Machine, Random Forest Classifier, and Visual Geometry Group 22 (VGG22), a model that was developed for deep learning employed a dataset of 2,870 retinal fundus photographs, including 1500 photos of people with glaucoma and 1370 images of healthy people. The pictures were pre-processed, and then the Optic Disc and Cup Segmentation and Ratio (ODCSR) approach was used to extract their features. We trained and tested all five models using a 10-fold cross-validation procedure, then analyzed their accuracy, precision, recall, and F1-score performance. According to our research findings, VGG22 beat all other models by attaining an overall accuracy of 99.3%. This is compared to the overall accuracy of 89% achieved by Random Forest, 88.1% achieved by SVM, 96.0% achieved by AdaBoost, and 94.4% achieved by KNN. The VGG22 model has superior accuracy, recall, and F1-score performance compared to the other models. In contrast, KNN had the worst accuracy, recall, and F1 score out of all the models.

Keywords: AdaBoost, KNN, SVM, Random Forest, VGG22, Optic Disc Cup Segmentation Ratio, Glaucoma Detection.

EfficientNet B5 Powered Multiclassifier Voting Framework for Watermark Text Classification

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In this paper, we present a watermark text detection and classification approach leveraging the EfficientNet B5 model for feature extraction, combined with multiple classifiers, including k-Nearest Neighbors (k-NN), Support Vector Machine (SVM), and Random Forest (RF). EfficientNet B5, known for its scalable architecture that optimally balances network depth, width, and resolution, provides superior feature extraction across various image scales, making it highly effective at identifying subtle patterns and distortions introduced by watermarks. The model's efficiency, using fewer parameters than many deep learning models, results in faster training times while maintaining high accuracy. EfficientNet B5 excels in capturing both fine-grained and global features, enabling effective differentiation between watermarked and non-watermarked regions, even in complex natural scenes. Its pre-trained weights, trained on large datasets, further enhance transfer learning, reducing the need for extensive training data for watermark detection tasks. Experiments conducted on two publicly available datasets demonstrate the robustness of the proposed approach. By implementing a majority voting decision mechanism that integrates the strengths of individual classifiers, the weighted voting method consistently outperforms the standalone classifiers in terms of accuracy, precision, recall, and F1-score. Specifically, the approach achieved accuracies of 94.80% on Dataset1 and 92.60% on Dataset2, underscoring its adaptability across diverse datasets. Additionally, the weighted voting mechanism further enhances classification performance, achieving improved accuracies of 97.10% and 94.80% for Dataset1 and Dataset2, respectively, contributing to more balanced classification outcomes. These results highlight the potential of combining deep learning-based feature extraction with traditional classifiers for effective watermark detection and classification in diverse natural scenes.

Keywords: EfficientNet B5, Voting System, Digital Watermarking, Natural Scene Images, Deep Learning, Watermark Text Classification.

Automated COCOA Disease Detection Using Convolutional Neural Networks: A Case Study of VSD and Other Pathogens

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Theobroma cacao L., commonly known as COCOA, is a plantation crop of significant economic value, renowned for its dried fruits. The high market demand for cocoa is not negatively correlated with its low production output. The high prevalence and quick spread of illness is the main problem in cocoa farms. A majority Vascular Streak Dieback (VSD) is a prevalent illness. To maintain productivity, appropriate treatment must be administered promptly. The diagnosis of cocoa leaf disease diseases can be sped up and made simpler by utilizing a "Convolutional Neural Network (CNN)" to identify diseases based on leaf images. The main objective of this research article is to distinguish VSD-infected cocoa plants, we have used total 1200 image for classification of VSD disease. DenseNet-19 shows the best result with accuracy of 99.1% in 7.48 minutes only.

Keywords: COCOA Leaf Disease, Vascular Streak Dieback, CNN.

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